



FRIDAY, SEPTEMBER 27, 1901.

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Contributions

Possible Changes of the Southern Pacific Line.

Newark, Del., Sept. 19, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The projected changes of line on the Southern Pacific, as shown on the map in your issue of Sept. 13, p. 644, are very interesting to me, being familiar with that part of the country. The change from Echo via Coalville to Salt Lake City would cross the Wahsatch Range, the



sides of which are rugged, with steep slopes. From Echo to the summit the rise is about 1,400 ft., and the descent from there to Salt Lake City 2,500 ft., so that with the development needed, for even a 2 per cent. grade, the saving in distance is not very apparent. The change (marked No. 1) from Ogden to Lucin is very good, as the new line is almost level and not only saves distance, but the crossing of Promontory Range with 400 ft. of rise and fall, as well as some objectionable grades and curvature. On change No. 2 from Salt Lake City to Wells a ruling grade of 1 per cent. can be had, with easy curves, light work and but two large undulations. The grading will be light as the greater part of it is valley work, and the ranges to be crossed have mostly smooth sides, and gentle slopes. Change No. 3, from Salt Lake City to Elko should pass over the same route as the preceding one to about the place indicated on the map by the figure "2," or approximately that distance from Wells. It will cross one range more than the other line, and that may not be easily done with the assumed ruling grade. But both lines as shown are much too direct for that part of Nevada, when going in that direction; to go southwest would be very easy. The general trend of the ranges is such that the lines as drawn would cross them at about an angle of 70 deg., and there is no general break in them, except where the Humboldt River runs nearly westward. In going through the different passes west of the desert the lines would be so crooked that the saving in distance would not probably amount to much over that effected by line No. 1.

Changes may be made to advantage farther west. A minor one at Wadsworth would shorten the route, and abolish an objectionable grade. The road as built ran down the left bank of the Truckee River beyond the town, and then crossed that stream and went up the other side with a heavy grade until opposite to the town, when it swung around eastward. The grade is heavy enough to require helping engines. The line should cross the Truckee, about 15 miles further up stream, and ascend with a light grade (estimated at 0.5 per cent.)

until it joins the track above the eastern end of the heavy grade.

Another grand change should be carefully considered, which is, whether the best results can be had by making a tunnel on the present route over the Sierra Nevada or abandoning it and crossing at Beckworth Pass, saving thereby over 2,200 ft. on an undulation having a ruling grade of not over 1.3 per cent., instead of 2.2, and not needing any snow sheds.

JAS. R. MAXWELL.

A Review of the Different Systems of Compounding.

BY F. F. GAINES.\*

The building by the Schenectady Locomotive works of several tandem compounds for the Northern Pacific Railroad, calls into prominence a type of compounding that, while not new, is represented by only a limited number of its kind. The interest aroused by the publication of the drawings makes a fitting time for reviewing the mechanical features of the different systems.

Outside of minor details, by-pass valves, etc., there are practically three systems of compounding in use in this country on locomotives: the two-cylinder, or cross-compound, the Vauchain type of four-cylinder compound, and the tandem, four-cylinder compound. Each type has its advantages and disadvantages. To enumerate some of each that have occurred to the writer, may be of interest and cause other points not covered, to be brought out.

The two-cylinder compound, from data available, is probably as economical as regards fuel, as any type. For the future, however, it is handicapped by physical limitations. In order to furnish the requisite power, the low pressure cylinder on powerful engines becomes of such diameter, that it is impossible to clear the profile of the average railroad, roundhouse entrances and drop-pits. To evade this difficulty by using a long stroke and smaller diameter cylinder, brings into existence another difficulty. With a long stroke, exceeding half the diameter of drivers, the cost of maintenance of rods, crossheads and driving boxes assumes a rapid increase. This increased cost does not follow the straight line of the ratio of stroke to diameter of wheel, but rather a parabolic line, which rises rapidly beyond the minimum. The objection to a comparatively long stroke may be compensated for, to a certain extent, by the economy of steam consumption and fuel; yet an engine failure may loom up larger in the eyes of a general manager, than the extra amount of coal burned. The long stroke for slow speeds, such as pushing service, is not so objectionable, but a moderate stroke, where possible, seems preferable. This type of compound has a tendency to strain the frames and cylinder fastenings, due to the fact that it is impossible at all times, and under all conditions, to make the power equal on both sides of the engine.

The Vauchain type of compound, with one cylinder above the other, has several advantages over the two-cylinder type, as well as defects which are not found in it. The connecting of the two piston rods to one crosshead makes a very heavy crosshead. The larger the cylinders, the greater the leverage on the crosshead of any unbalanced forces in the two cylinders. Consequently the guides must be made very heavy and stiff. As in the two-cylinder type, one valve on each side of the engine controls the steam distribution. The double pistons, rods and heavy crossheads make it impossible on a small diameter of wheel, to properly counterbalance the correct amount of reciprocating weight. On the other hand, when properly counterbalanced on engines having large wheels, it makes a very hard engine on tracks and bridges. The large area of cylinder surface, cylinder heads and valve chamber heads, piston rods, etc., leaves an opportunity for considerable condensation and radiation.

The tandem type has not the objectionable crosshead features, but has the same trouble as the Vauchain type, as to weight and balancing of reciprocating parts. It also has even greater possibilities for condensation and radiation, due to the large surfaces exposed.

Theoretically, we should never have collisions of any kind. Practically, they have to be taken into consideration, as a proportion of the cost of maintenance of all engines and rolling stock. The tandem compound seems to be least protected from damage, of the three types, on account of the exposed position of high pressure cylinders and valves. The use of two valves on a side, would seem to indicate the rapid wear of motion work. A piston valve may be a good thing; it is not any better for being doubled.

The defects of all three types are real, and so great that notwithstanding the generally acknowledged economy in fuel consumption, they are a good ways from superseding the simple engine. The economy granted, it becomes advisable to remedy the defects. It would seem that this can best be done by designing a type of four-cylinder or three-cylinder compound, having one or two cylinders inside of the frames, and two outside, with a single valve between the high and low pressure cylinders operating both. The reciprocating parts could be entirely balanced, and many details of the machinery could be made lighter on account of the better distribution of the working forces. In short, remove the frills from the DeGlehn compound, and incorporate in the design, American simplicity and strength, and we will then have our fuel economy minus the drawbacks of the

\*Mechanical Engineer, Lehigh Valley Railroad.

existing types of compounds. It would require time and ingenuity to accomplish this result, but it is possible, and probable.

Another advantage of such a type lies in the fact that on account of the reciprocating parts being balanced the engine would be very much easier on the track. This could be taken advantage of, to increase the present allowable wheel weights. In fact, one mechanical engineer connected with a locomotive works believes that under such conditions and with such a type of engine, it may be feasible to carry such a weight on four drivers, that an eight-wheel, or at least an Atlantic type engine, might be made as powerful as the present 10-wheel and Prairie types.

Eastern Maintenance of Way Association.

The nineteenth annual meeting of the Eastern Maintenance of Way Association (known for years as the New England Roadmasters' Association) was held in Rochester, N. Y., beginning Tuesday, Sept. 17. The programme of the meeting and list of papers was duly published some weeks ago in our department of Meetings and Announcements.

The meeting was called to order by the President, Mr. F. E. Sibley, Roadmaster, New York, New Haven & Hartford, New Haven. The officers elected for the coming year were: President, L. Curtis, Roadmaster, Boston & Maine, Lawrence, Mass.; Vice-President, George A. DeMore, Roadmaster, New York, New Haven & Hartford, New London, Conn.; Secretary and Treasurer, F. C. Stowell, Assistant Roadmaster, Boston & Maine, Ware, Mass. (re-elected); Executive Committee: R. P. Collins, Roadmaster, New York, New Haven & Hartford, Readville, Mass.; J. W. McManama, Roadmaster, Boston & Maine, Waltham, Mass.; T. J. Sullivan, Roadmaster, Boston & Albany, Springfield, Mass.; W. E. Tuttle, Roadmaster, N. Y., N. H. & H., Taunton, Mass.

Boston was selected as the place for the next annual meeting. The meeting itself was cut short by the fact of the death of the President, and indeed there was no discussion of papers, but it is expected that written discussions will be handed in which will appear in the annual report of the Association. The address by Mr. Derr, which had been announced, was not delivered. Short abstracts of some of the papers and committee reports follow.

A report was submitted on "Training Section Men for Foremen," by Mr. R. P. Collins. He lays down as the first essential that it should be understood by all that a foreman would not be hired or transferred from another division so long as there are men in the ranks fit for promotion. He holds that the candidate should have some education and points out the good results that may be had from selecting promising men and putting them in extra gangs where they have an opportunity to see a

of work. He suggests that on construction one may learn faster than in the regular routine of maintenance. The underlying idea of his report is that the roadmaster should have a few promising men in training—men of character and education—and that he should take pains to see that these men get a chance to learn accurately all the details of their work. Then the roadmaster will always have material on which to draw for his supply of foremen. He suggests further the desirability of occasional meetings of the foremen and others interested. Good results have been secured by this method.

A report was presented on the methods of "Increasing the Life of Crossties," signed by Mr. L. Curtis, Chairman, and Messrs. C. B. Lentell and John Savage. They lay down the principal points of advantage and disadvantage in different kinds of ballast, and consider good ballast as the first point in the preservation of crossties. They recommend the use of tie plates under favorable conditions; that is, under heavy traffic, with a well ballasted and well-drained roadbed on ties of durable wood, "tie plates will add from three to five years to the life of the tie." The committee suggests that tie plates should not be used on ties of short natural life, unless these have been treated by some preservative process, and further, that they should not be used on oak, as the wood itself is hard enough to resist wear. They should be used at terminals, bridges and all other places where the cost of renewing ties is high.

The committee makes no recommendation as to preservatives, but does recommend the use of plugs in spike holes. It is also recommended that bark should be taken off the ties and they should be thoroughly seasoned.

A report was presented on the "Prize System in Maintenance Work," signed by Mr. E. A. Haskell. He is quite strenuous in recommending that the inspection should not be made at regular stated periods, but that the road should always be in proper condition to be inspected. He recommends that the marking should be done by superior officers and not by those who may be closely interested, even if it be indirectly. He recommends a varying scale of values for different kinds of work in forming the final estimate, and finally he says that there can be no doubt of the benefits resulting from the prize system in stimulating employees and in bringing practical returns to the company.

A report was presented on the "Maintenance of Grade Crossings." This is signed by Mr. F. C. Stowell, Chairman, and Messrs. E. H. Bryant and H. M. Steward. They agree that there is no really good way to build a crossing at grade which is cheap enough to be approved by the average manager. They criticize the practice of



laying a rail on its side and putting planks up against the flange of that rail as being dangerous to horses; "draft horses stepping on the upright edge of the rail base slip sidewise." They consider that a better method would be to put the second rail upright, leaving a proper flangeway of 2 1/4 in. They recommend that the flangeway be blocked by wood fillers.

Mr. J. B. Stouder, Roadmaster of the Chicago & North Western, presented a paper, "The Use of Floating Gang." He makes a distinction between a floating gang and an extra gang. The former being a gang more or less permanent in its composition and the latter a gang of which the foreman only is permanent and the men are discharged when the special work for which they are employed is done. It is Mr. Stouder's opinion that when the floating gang is properly managed it will do quite as good work as a regular gang, and on the work of rail laying and putting in switches it will do more uniformly good work. This comes from the fact that the floating gang has a more varied experience than the regular gang and so is likely to develop more skill. It is suggested that on busy roads it is desirable to have a gang available for odd jobs and accustomed to hurry up jobs. If there is not enough work to keep such a gang busy through the year it may be used on a work train. The difficulty is naturally to keep the men in the service long enough to make them efficient, but the foreman, also, should be selected with particular care. It is important that the work should be carefully considered and planned in order to keep the gang at work and to have it work to the best advantage.

#### The Foundation for the New York Stock Exchange.

BY C. F. MAURICE, C. E.

We have previously published in the *Railroad Gazette* descriptions of the cylindrical wooden caissons and the air lock designed and patented by Mr. John F. O'Rourke. (See our issues of Dec. 9, 1898, page 877, and Aug. 17, 1900, page 552). Since the latter time Mr. O'Rourke has made important developments in pneumatic wooden caissons and in the foundations for the New York Stock Exchange, designed and now being built by him, he has embodied his latest designs and improvements.

The work is of unusual magnitude for a building. There are 37 cylindrical caissons and two rectangular ones for supporting the interior columns, and 14 rectangular contiguous caissons forming a water tight dam around the larger portion of the lot. Rock is found from 45 ft. to 55 ft. below the curb on Broad street next the Commercial Cable Building. Above the rock is a layer of hardpan from 2 ft. to 8 ft. thick, and above that and extending to the surface is a quicksand of extreme instability. The ground water is about 6 ft. below curb level. It will be seen that the existing conditions, while bad for ordinary foundation work are well adapted for pneumatic caissons.

In the basement and cellar of the old Stock Exchange was one of the most extensive safe deposit vaults in the city. This is maintained and kept in regular operation during the construction of the new building and will not be torn down till a new one is built adjacent to it. In order to provide for the new vault, and also owing to the value of cellar space, it was decided to have a basement and two cellars covering the larger part of the lot. The floor of the lower cellar will be 42 ft. below the Broad street curb and the necessity of a water-tight dam round this part of the lot is apparent. The foundations of the Commercial Cable Building (described in our issue of June 5, 1896, p. 390) are relied on to provide the dam along the southerly side of the new foundations. It may be remembered that when the Commercial Cable Building was built cast-iron shoring cylinders 30 in. in diam., filled with concrete, were sunk to rock under the adjoining wall of the Western Union Building. This building has been torn down to provide additional space for the new Stock Exchange, and the shoring cylinders, which have been kept in position, will support the south wall of the new building. The round caissons in the space enclosed by the dam are not filled with concrete, as is usually done, but have only enough concrete to bring the column footings to grade. After the cellar is excavated these caissons will be cut off below the finished floor level. The reason for this is obvious.

It might seem that, as the cellar is to be excavated nearly to rock, much unnecessary work is being done by sinking interior caissons, but owing to the height and comparative thinness of the dam it is necessary to brace it as the ground is removed from the interior. By the course adopted the columns and floor beams will be set before the excavation is finished, thus giving the necessary bracing. Moreover, much time is saved in building as the steel work is begun sooner than would otherwise be possible. Work on tearing down the old buildings was begun the first of last May and finished about July 9. The first caisson, caisson "D," was set in position some weeks before the old buildings were removed. The tedious work of removing the old buildings and the necessity of maintaining the old safe deposit vaults caused considerable inconvenience and delay. At the time of publication all the rectangular caissons and all but three of the cylindrical ones have been finished. Almost all the steel caissons in the portion of the lot south of the old vaults have been set and also a number of the floor beams and girders.

Fig. 1 shows a general plan of the lot and adjacent buildings and gives the size and location of the caissons

and the present location of the safe deposit vault. The new vault will occupy the space between the rows of caissons just south of the present location. It will be seen that there are 14 caissons forming the dam, varying in length from 24 ft. to 30 ft. 1 1/2 in. They are all 8 ft. wide, except "J," which is 7 ft. They are built up vertically in three or more sections; the first containing

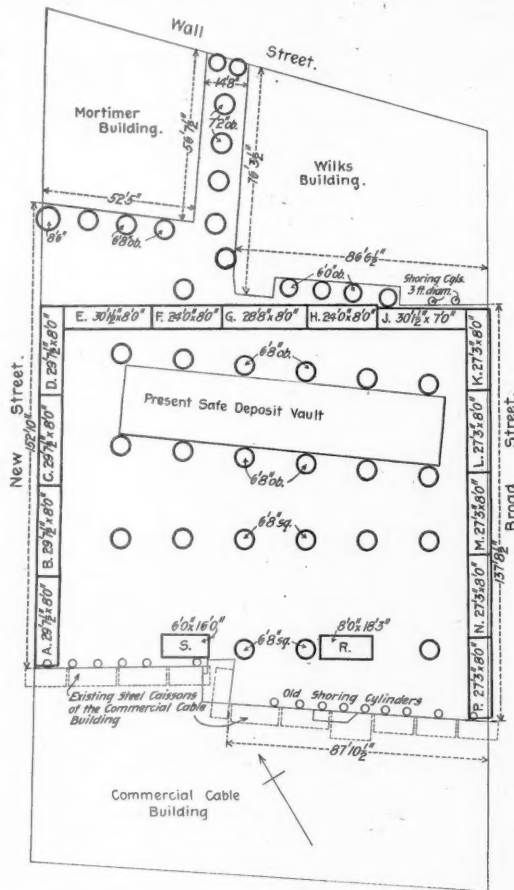


Fig. 1.—General Plan of Stock Exchange and Adjoining Buildings.

the air chamber is 8 ft. high, and there are two sections of coffer dams 15 ft. high each. A third section of coffer dam, of the required height, is used where necessary. Each section is built of 4-in. x 12-in. planks bolted to steel angle frames. Lateral stiffness is obtained by tie rods and timber struts. The roof of the air chamber is of steel plates stiffened by angles and partially arched in cross section. The air chamber sections weigh from 8 to 9 tons and the coffer dams from 10 to 12 tons.

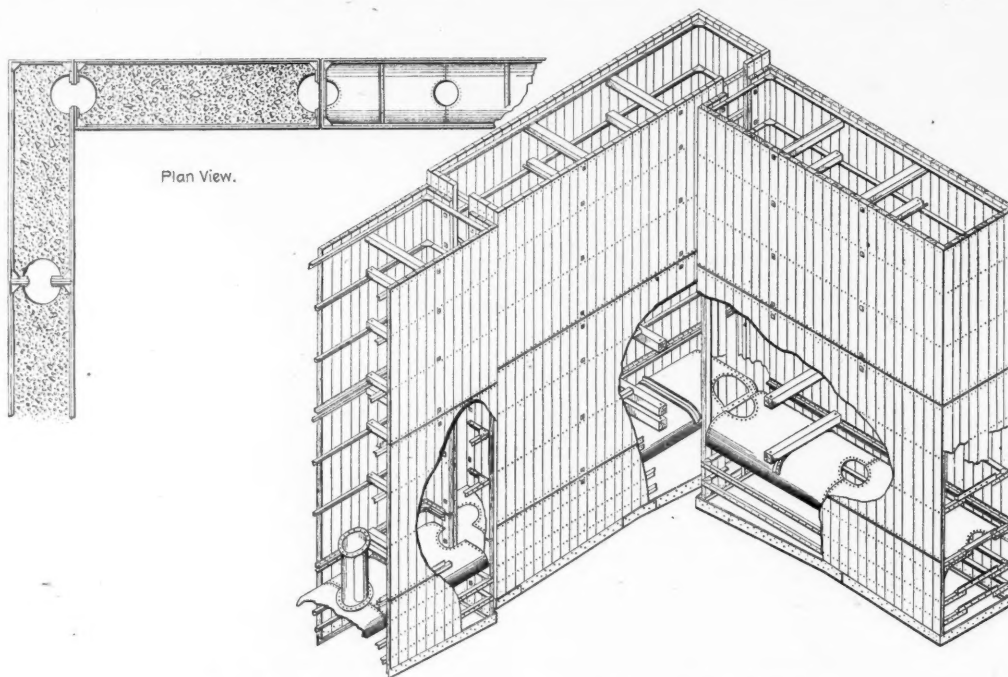


Fig. 2.—Isometric Drawing and Plan of Caissons "D" and "E."

Fig. 2 is an isometric drawing and plan view of "D" and "E" and shows the typical construction.

Fig. 3 is from a photograph showing caisson "D" in course of sinking and the air chamber section of caisson "E."

Fig. 4 shows almost the entire lot and gives a good idea of the work in course of construction.

In sinking a rectangular caisson the section containing the air chamber is set in place and then one or two coffer dams bolted to it. It is kept in position by strongly braced frames of 12-in. x 12-in. timber. Concrete is

then put in above the roof of the air chamber. Where possible two derricks are used on each caisson, one for hoisting the material excavated from the air chamber and the other for putting in the concrete in the coffer dams. This concrete serves a triple purpose. It gives additional strength and stiffness to the caisson, it provides weight for sinking, and it finally forms the dam.

The caissons themselves are sunk till the cutting edge enters hardpan and the excavation is continued down to rock, which is then cleaned off and the space concreted up to the roof of the air chamber. The air shaft, which is of steel, is not removed, and after all other work is done it is filled with grout. A small special air lock is put on top of the shaft and an air pressure turned on of about 20 lbs. per sq. in., which forces the grout into any spaces that may occur between the roof of the air chamber and the concrete below. The time required to sink a caisson varies considerably, but where difficulties are not encountered it may be taken at an average of 1 1/2 days for a cylindrical caisson and four days for a rectangular one.

The air lock and the cylindrical caissons are of practically the same construction as those already described in our issues mentioned above and need not be considered here at length.

Those adjacent to the vault and adjoining buildings have the patented oblique cutting edge and the others have the cutting edge at right angles to their vertical axes. The oblique cutting edge, as our readers may remember, acts as a safety valve, as in case of a "blow-out" the air will escape along the line of least resistance, in other words, under the highest part of the cutting edge, which is on the side away from the building.

The rectangular caissons forming the dam are a departure from previous practice, both in general idea and detail construction. They also have the oblique cutting edge, the efficiency of which is well proved by the fact that no material settlement of the adjoining buildings has occurred, though on the northerly side of the lot are the Mortimer and the Wilks buildings, respectively eight stories and ten stories high, both resting on the quicksand. As a precaution two shoring cylinders were sunk to hardpan under the wall of the Wilks building, but except for this practically no shoring was required.

But the most interesting and novel feature of these caissons is the method of making the joints between them water tight. This is one of Mr. O'Rourke's many patents in caisson construction, and it makes practically one caisson instead of a number of separate ones. By referring to Fig. 2 and the following description this will be made clear. The two center end planks of the caissons above the air chamber, and the corresponding planks of the coffer dams are cut with a bevel to the vertical and are bolted to angles, which are bolted, in turn, with lap joints, to the end stiffening angles. These latter are not continuous across the ends, but have a space of about 3 ft. between their ends. The concrete in the coffer dams is kept back from these plank by semi-circular steel cylinders, which are pulled up as the concrete sets.

A portion, about 4 ft. 1 in. x 2 ft., of the ends of the air chambers is also made removable, but in a horizontal instead of a vertical direction. The concrete

in the air chamber is kept back from this portion of the end or side where the next caisson will be placed, and when the concrete has been brought up to the top of the cutting edge the removable part of the opposite end, or end adjacent to the caisson previously sunk, is pulled out, that is, into the air chamber. This, of course, exposes the removable end of the caisson previously sunk. The space between the caissons round the edges of the opening are then filled with clay to prevent the escape of air and the inflow of water. The compounding portion of the previous caisson is then pulled into the air



chamber of the last caisson, allowing an entrance into the semi-circular space left in the end of the caisson previously sunk.

This space is then cleaned out and concreted simultaneously with the air chamber of the caisson just sunk. It is seen that this makes the concrete continuous from air chamber to air chamber. The plank of the coffer dams on each side of the beveled planks are drawn together by a number of 1-in. bolts. The angles holding the beveled planks are then unbolted from the end angles and the beveled planks pulled up and the cracks between the caisson caulked. There is thus provided a circular space in the concrete from the top of the roof of the air chamber. Fig. 2 shows the adjoining caissons with these plank and some of the end angles removed. Only one section of shaft is shown in order to avoid confusion of detail. At the ends of the roof of the air chamber a semi-circular hole has been provided and covered by a plate, bolted to the roof, of somewhat smaller diameter than the space left in the concrete. This space between the coffer dams is then pumped out, and the plate unbolted and taken off from the roof of the air chamber, exposing the concrete below, and then concreted.

The idea of using caissons to form a water-tight dam is not new, it having been used in the foundations for the Commercial Building, which were also designed by

which he states are: First, that the concussion should be evenly and squarely met on a central line; second, that the pulling strain should be on a central line to avoid all tendency to crowd the flanges against the rail; third, that the connection should be so flexible that there should be no unnecessary friction at any time or difficulty in coupling on any practicable curve; fourth, that the device should be capable of having its strength increased to meet future requirements of heavier motive power; fifth, that it should be always operative; sixth, that there should be as great a uniformity as there was in the link and pin. "In my opinion," he continues, "the present style of vertical plane coupler contains none of these essentials."

In connection with this announcement, I wish to call attention to a series of *natural sequences* that are directly traceable to the conspicuous absence of these *essentials*. Anyone consulting the files of the *Railroad Gazette*, for the past three or four years, will find numerous articles concerning the increase of break-in-twos or trains parting, and in the wear of truck wheel flanges, necessity for improvement in the draft rigging, etc. The reader of these articles will find that they often wind up by declaring that the present coupler has imposed conditions that make accidents frequent, and increase the wear and strain on the different parts.

Some of the most significant utterances and recitals of experiments made were given out at the last Master Car Builders' Convention, which are to be found in a report entitled "Test of M. C. B. Couplers." Among these Mr. R. P. C. Sanderson made the following observation: "At a small repair yard I was watching a 16 x 24-in. switch engine pull a single empty side-dump car off the rip track that had just had a new coupler put in, and that coupler was pulled in two; the material was good, it was not broken by the tension strain, but the head was wrenched off." Following this was the narra-

street to Grand avenue. Of seven sets of intersecting lines of as many pairs of cars which I examined, the least angle produced by any two of these intersecting lines was 18 deg. The greatest angle recorded was 28 deg. Not one of these cars was over 35 ft. long. Any two 40-ft. cars would have increased the angle on any of these curves 4 deg. In other words, where two 35-ft. cars, standing on a curve are at an angle of 18 deg. two 40-ft. cars would be at an angle of 22 deg. on the same curve, and when two of the former were at an angle of 28 deg., two of the latter would be at an angle of 32 deg.

In the face of these facts it is certain that a radical departure must be made from the style and dimensions (note the fact that I do not say type) of the couplers now in general use. "Their continuation," as Mr. Sanderson said at the last Master Car Builders' convention, "means worn rails, bursted draft-gears, split draft timbers, damaged carrier irons, worn wheel flanges, and increased tractive resistance to trains." To this catalogue of evils I will add, increased number of break-in-twos.

On this point I want to call attention to some brief statistics. A year ago the Nashville, Chattanooga & St. Louis, which has 1,200 miles of road, and gave out a month's record of trains parting, which was 63 in number. This is less than one-half of 1 per cent. of the railroad mileage in the United States. If other roads keep up this average, as we have every reason to believe they do, we have the startling record of 10,000 break-in-twos every month, or 120,000 every year. The loss from wrecks occasioned by these accidents must run up into the millions every year, or enough to equip one-half of the cars of the country with a coupler that will make "break-in-twos" largely a thing of the past. There is an effectual and simple remedy for this condition of things, and that is a *flexible drawhead*. There are several ways to secure this, but the most simple is to have the drawhead swivel upon the forward end of the shank.

I will explain my own design. The contour lines of the head and knuckle are in strict conformance to the M. C. B. lines, except the guard arm, which has the forward end produced until it is in the same vertical plane with the front face of the knuckle when the latter is closed. I am able to extend the guard arm in this way with perfect impunity, since the flexibility of the head



Fig. 3.—Caissons "D" and "E."

Mr. O'Rourke. These caissons were built of steel and the joints between them were filled by running in clay. Similar foundations have just been built for the Mutual Life Building.

To those familiar with caisson construction the economy of material of Mr. O'Rourke's design is at once apparent and the scope of work for which these caissons are adapted may have occurred to some of our readers. Where large piers are to be built instead of sinking one caisson, requiring a great amount of steel or timber, a continuous dam of concrete or masonry may be built and the space so enclosed excavated and then filled with the desired material for the foundation, producing the same results as obtained by one large and costly caisson. Nor is there any practical limit as to size, within reason, of the foundation which may be built by this method. It would seem to be ideal for the construction of dry docks.

#### The Car Coupler Problem.\*

"Does the present style of vertical plane coupler meet with all requirements? Has it come to stay?" These are the headlines of a paper† read by Mr. Pulaski Leeds, before the Central Association of Railroad Officers some two or three years ago. Continuing, he answers his own question as follows:

"A concise statement of my opinion would be an emphatic negative to the first and an equally emphatic affirmative to the latter." Further on Mr. Leeds enumerates the "conditions and requirements of service" that are to be met with.

\*From a paper by Mr. J. B. Thomas presented at the September meeting of the St. Louis Railway Club.  
†*Railroad Gazette*, August 12, 1898, page 579.

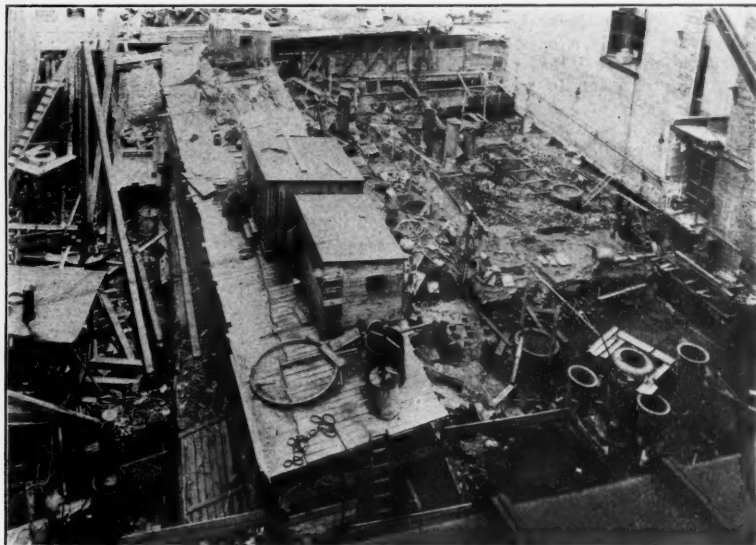


Fig. 4.—A Progress View of the Stock Exchange Caisson Work.

(The covered structure is the old safe deposit vault, which has been kept in service throughout the work. The shanties on top are tool houses and store rooms.)

tion of an experiment made by Mr. C. A. Schroyer, of the Chicago & North Western: "In regard to the point," said he, "brought forward by Mr. Sanderson, we took up that question and determined the pressure occasioned by the lateral motion of cars rounding curves, between long and short cars, and found that the side motion of these cars produce pressures sidewise of from 3,000 to 57,000 lbs. on the couplers on our longest cars. That was done by making the carrier iron wider than the ordinary carrier iron, and filling up the space between the stem of the bar and the carrier iron with a lead block, and we found the compression in the lead block was  $\frac{5}{16}$  in. We afterwards put the mate under the compressing machine, and found it required 57,000 lbs. to compress the block to the same extent it had been compressed on the car. We realize the importance of giving our cars some lateral motion."

One of the strongest evidences of the lateral strain which the stem of the drawbar undergoes, and imposes a corresponding strain upon the draft timbers as well as the flanges of the wheels, is the number of couplers to be found in every scrap heap whose shanks are broken anywhere from 2 to 8 in. back from the shoulder. From templates constructed according to strict M. C. B. lines it is found that the greatest angle obtainable by two cars in rounding a curve, without impinging against the sides is 10 deg. When a greater angle than this is obtained the record made by Mr. Schroyer is repeated.

In order that I might determine the relative position of two freight cars standing on some of the curves found in the freight yards of St. Louis, I made a trip, several weeks ago, through the yards from North Market

enables it to readily yield when it comes into contact with an opposing coupler, whether that coupler be its companion or one of the couplers now in general use. Another feature of this coupler is the manner of adjusting or swiveling the drawhead on the shank. At the forward end of the shank are two lugs, one on the top and one on the bottom; these lugs are  $2\frac{1}{2}$  in. in diam., and the strain which they have to stand is the same as the knuckle pin, which is  $1\frac{1}{2}$  in. in diam. So these lugs are four times as strong as the knuckle pin, consequently it cannot be urged that there is any inherent weakness at this point. Over the lug a cap is fitted, the object of which is to prevent friction on the lugs of the shank, while the cars are rounding a curve. When the caps have been adjusted the next move is to place the steps. After the steps have been placed in position, the ball bearing is placed in its groove and then the drawhead is pushed over the steps and the bolt is adjusted, which secures the drawhead. This simple ball bearing has the positive effect to always restore the normal position of the drawhead, which is in alignment with the shank, whenever it is released from any strain. The wear upon the coupler is confined to the caps and the steps, the total weight of which is 25 lbs. These, however, will not require renewal oftener than once in three or four years.

The next thing to consider is the knuckle with the adjustable hood. It is a well known fact that 95 per cent. of the knuckles are now retired after a six or 12-months' service, because the inner face is worn to the danger point, while the body of the knuckle is comparatively intact. To offset this loss I have provided a





### The Wabash Entrance to Pittsburgh.

Since obtaining control of the Wheeling & Lake Erie as the initial step in its plan to enter the Pittsburgh district the Wabash has made definite progress on the 61 miles of track to be built from the Wheeling & Lake Erie at Jewett, Ohio, to the City of Pittsburgh. This extension will be laid throughout with 85-lb. or 90-lb. rails, the 10 miles out from Pittsburgh to be double track. This latter section, which includes the cantilever bridge over the Monongahela River, a tunnel 3,200 ft. long through Mount Washington and, after a short in-



Sketch of the Wabash Entrance to Pittsburgh.

terval therefrom, the Greentree tunnel, 4,700 ft. long, has been attacked first, three contractors being engaged in boring the Greentree tunnel from both ends and in both directions from a shaft sunk in the middle of the hill, in cutting the approaches to the Mount Washington tunnel and in the preliminary work on the bridge piers. Bids have been received for construction of the 28 miles of track to be built westward from the end of this 10-mile section at Bridgeville and the contracts will probably be let by the middle of this month. The remaining 23 miles which include a cantilever bridge over the Ohio River have not yet been definitely located and plans for the bridge await the approval of the Secretary of War. This bridge will have a main span of 750 ft., some 64 ft. shorter than the main span of the Monongahela bridge. Both bridges will be 80 ft. above the normal water level.

Construction at the eastern end of this new line has been pushed, notwithstanding that the City Council of Pittsburgh has not yet passed the ordinance granting right of way within the city limits. This ordinance was presented about May 1st, referred to the Committee on Corporations which has not reported it back to Councils. When work was begun on the pier on the Pittsburgh wharf, the city of Pittsburgh asked that further operation be enjoined pending the disposition of the ordinance; the injunction was, however, refused by Judge McClung.

The commonest kind of common sense teaches us that when the constitution undertook to take away from the legislature the power to discriminate in favor of one and against another company, it did not intend to leave with it a power to say that one company could go where it could do the business of the cities, but others must be content with the business of the rural districts, nor to say (what is the same thing), that one might come into a city where it could get the business, whilst the other must stop at the city line, where it certainly could not get even a respectable share of the business. What the legislature cannot do directly it of course cannot do indirectly through the municipal corporation.

When by the constitution a railroad company is given the right to build a railroad into a city it is given, by implication, the powers necessary to the enjoyment of that right. This is a familiar principle that is universally recognized. A railroad cannot be built into a city without crossing some highways. At least, this is the prima facie conclusion, and holds until the contrary is shown, and we have as yet nothing to the contrary in the present case.

A very important feature of the scheme is, of course, the location and arrangement of the Pittsburgh terminals but, beyond the announcement that the passenger station will be at the corner of Liberty and Ferry streets,

President Ramsey refuses (properly) to divulge the plans in this respect. It is evident, however, that on the limited right of way east of the Monongahela River space cannot be obtained for handling other than local freight, produce and high-class shipments. A freight yard cannot be located between the Monongahela river and Mount Washington, nor between the western end of the Mount Washington tunnel and the western end of the Greentree tunnel which opens on an approach to level land. This means that freight yards for handling a large business cannot be located within nearer than three miles of the Monongahela River; that to obtain traffic from mills along the river long and extensive connecting tracks will be necessary; that connection cannot be effected at all with the mills that are situated along the Allegheny River and in other parts of Pittsburgh and Allegheny. But a vast tonnage comes from the numerous mills that line the eastern bank of the Monongahela, principal among which are the Homestead and Duquesne works of the Carnegie Company and the mills of Jones & Laughlins; this region is undergoing rapid development.

While a share of this tonnage and of traffic from the coal fields which it will penetrate may alone justify this extension of the Wabash it would not seem that in so far as (at even rates) the volume of its probable traffic is concerned, it will be a serious competitor of the other in-

### Engine House Facilities and Methods.\*

The general construction of the roundhouse should be such as to allow of ample room; the new heavy type of engine is too long for most of the present roundhouses. We would recommend a space of 10 ft. for passageway between the front of pilot and wall, and not less than 3 ft. between the rear coupler of tender and the doors. Doors should be so constructed as to have not less than three hinges put on so as to brace the door.

The ventilation and heating should be of the latest improved methods. The pit walls should be of mason work with 12 x 12 or 12 x 14 sills run lengthwise, on which the rails rest. The portion between pits should be filled with cinders or gravel slightly mixed with tar to preserve wood-work. This makes solid foundation to be used with or without flooring on top, preferably to have sills imbedded flush with this material, and flooring of 3-in. plank nailed to same, coming flush with top of rails.

We recommend a number of tracks to be equipped with overhead traveling cranes and pneumatic hoists, the cranes running longitudinally with the engine, and the trolley running transversely, to lift cabs, stacks, dome casing, sand boxes, front end castings, steam chests and covers, pilots, air pumps, etc.

The old style valve setting roller should be replaced by a stronger design mounted on roller bearings, and where considerable of this work is done, driven by air or electricity.

A well constructed drop pit with a jack mounted on wheels fitted with roller bearings should be provided, capable of handling 90-in. driving wheels. The truck drop pit is also essential, and should be carefully looked after.

Each stall should have a smoke jack of such design as to carry away the smoke and withstand the corroding effects of the sulphurous smoke.

Engines should head into roundhouse so the greatest room on account of the divergence of the tracks will be around the machinery portion where the most of the work is done, rather than the tenders. Where construction of house is suitable, work benches should be between the tracks, thus keeping everything away from the wall that passage way in front of engines may be unobstructed.

For the easy movement of material a space should be provided for a tool room where the equipment of jacks, wrenches, pin bars, etc., can be kept and given out on check, as the modern roundhouse must have a place for its tools and every tool in its place ready for immediate use. It is necessary for this tool room to carry a certain stock of bolts, nuts, washers, grate bars, etc., to avoid delays of men going to shops for this material.

Unless the machine shop is located within 75 or 100 ft., some provision should be made for a drill press and possibly a shaper in the roundhouse, so that they can take care of certain emergency jobs. This is to avoid the delays of running to another department.

The jack equipment now requires 40-ton jacks for the larger engines, and where they are in sufficiently frequent use to keep in condition they should be hydraulic; otherwise ball bearing screw jacks are preferable.

There is undoubted economy in providing a roundhouse with arc lights for general lighting, with incandescent lights located between each pair of tracks, hung so they can be taken in under the engines and into the fire-boxes for inspection work and repairs.

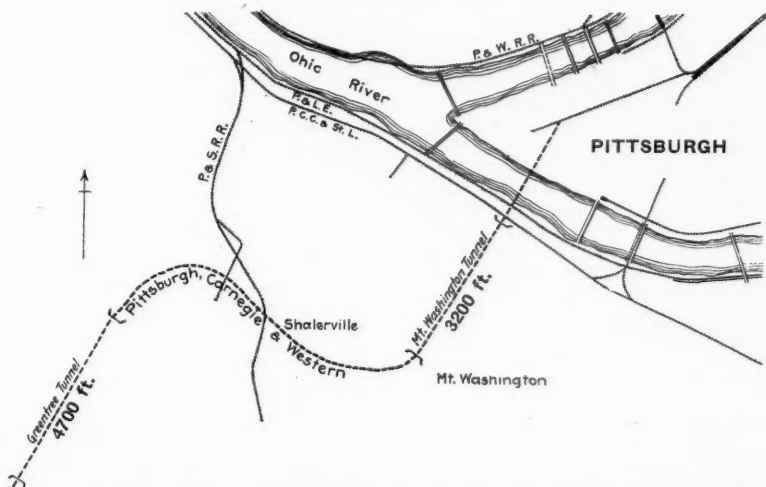
There should be a steam or air blower, preferably located on the floor between each pair of tracks, for firing up locomotives.

Sufficient tracks should be arranged for washout purposes, and these should be provided with a suitable boiler washer and tester, permitting of hot water in boiler washing and making the arrangement for boiler testing as simple as possible.

Very frequently two or three months' additional service can be got out of an engine by changing the tires without bringing it into the shop. There are two ways of accomplishing this: One is to jack the locomotive up sufficiently far from the tracks so that the hot tires will not burn the floor, and also that the burner can be put in position. The other is to simply take the weight of the engine off the rail and remove a section of the rail. Probably the former method is the better one. One track should have a concrete floor for this purpose, so that it will not burn.

Far greater care is necessary in the inspection of the larger locomotives than in the smaller older types, partly for the reason that our facilities have not kept pace with the increased weight of the motive power, and partly because the increased size of the parts of locomotives have made the inspection of them extremely difficult. It is therefore necessary to have picked men for this purpose, and the fewer in any one roundhouse the better. The same thing applies to the question of caring for the various journals. There should be a man appointed to look after the driving box sponging and truck box sponging, and also the tender truck journals.

The question of detailed inspection is a very essential one and should be carried down to the smallest parts of the air-brake equipment, steam heating equipment, front ends, smoke boxes, ash pans, etc., so that in case of any



Sketch of the Pittsburgh End of the Pittsburgh, Carnegie & Western R. R.

of the Common Pleas Court, on the ground that a clause of the constitution adopted by the State of Pennsylvania in 1868 permitted a railroad, where necessary, to cross the thoroughfares of a city, and that the Monongahela River and the adjoining wharf are thoroughfares of Pittsburgh. This decision, which is taken as a new interpretation of the Pennsylvania constitution that railroads will regard as a precedent in their favor is in part as follows:

Every one who knows anything at all about this clause of the constitution, knows that the general purpose was to encourage competition between railroad companies, and the particular intent was to take away the power of the legislature to smother competition by discriminating between different companies.

The only places that there can be competition between railroad companies are places where there is business enough to justify the existence of one or more than one company. This, of course, includes the cities of the commonwealth. In fact, these are the points that railroads must run to if they are to have competition. No important road doing a general business would be built within the State if it could not reach any of its cities, and to reach a city with a railroad means to go into that city.

The necessities of a railroad company and the public character of its business compel it to seek the heart of the city.

terests that are strongly entrenched in the Pittsburgh district and have lines interlacing throughout the surrounding region. The principal value of the new line will lie in its strategic importance. The Wabash, with lines between Chicago, St. Louis and the Missouri River, will also have its own line from Chicago to Pittsburgh, with connection for Cleveland and other commercial centers in the Central Traffic Association territory. This new line will, therefore, enable the Wabash to demand that a larger share of business be delivered to its western lines by the older roads leading from Pittsburgh than it could claim did it not have the power to seriously disturb rates in this central stronghold. At a crucial point in the game the Wabash has cleverly placed a knight.

Those who have taken places some time before starting in a train made up of cars which have been standing for hours in the sun at a temperature of 95 deg. or so, with doors and windows shut tight, and have survived that ordeal, will thank the Prussian Minister of Public Works (and would like to thank some one less distant) for an order issued last summer for cooling passenger cars a proper time before making up a train by washing down the roofs with cold water and opening the doors and windows.

\*Extracts from the report of a committee of the Central Railway Club, March meeting.

trouble the blame can be traced to the proper person, and if this continues change of men will be necessary. This will reduce the number of failures on the road very considerably.

#### Extracts from Discussion at April Meeting.

The President.—At the last meeting of the New York Railroad Club Mr. Vreeland, the President of the Club, made this statement: That at their new plant, their power-house at, I think it is, Ninety-eighth street, somewhere along the East River, they were now able to take the coal from the barge and put it into the fire-box for four and a fraction cents, less than 5 cents, a ton. They use the automatic stoker. At their old Houston street plant where they are now supplying the power, it costs them nearly 60 cents. And while those figures would probably be no comparison to some of our costs on railroads, yet I believe that we in a good many railroads are paying 10 or 15 cents a ton for putting the coal into the engine where, with modern appliances it could be cut down to three or four. I recently made a trip to the west and I saw a coaling plant where the company had gone to a considerable expense in erecting a trestle for putting the coal up so that the coal could be dropped by gravity into the engine tender; but instead of having the trestle planned so that they could dump the coal into these pockets they were obliged to shovel the coal out of the supply cars into the pockets. By carrying up the trestle 3 or 4 ft. higher they could have dumped the coal into a pocket. Wherever we have coaling plants to coal the engines by gravity we get them high enough so that there will be no labor involved in dumping the coal into the pockets. In one of our shops we have recently put in an ash-pit and sandhouse by which we cut our cost in two, handling the ashes.

Mr. Bartlett.—I remember a case in point where the authorities said: "You are putting only 300 cars a day over the scales. We want to put over 600. What is the trouble?" The only answer was, "Facilities." Facilities are needed. That seems to be the solution of the problem you have under discussion to-day. I am of the opinion that facilities can be increased, improved and benefited by a closer co-operation of the engineering and mechanical departments. That is where I think the sticking point is to-day. I do not think the engineering department clearly understands that certain facilities in the roundhouses are required. The mechanical department is certainly clear upon that point, but neglect to make it manifest to the proper department. If this condition is made plain to the engineering department and representatives of these departments confer, I think you will see beneficial results. As a rule a transportation man in passing through a roundhouse does not notice all the details that a motive power man would notice. A transportation man is impressed with those things that are radically wrong. There are two things that have made such an impression upon me that it might be well to mention them here. One is the general condition and the bad drainage of drop pits, and the usually miserable condition of ventilating stacks of a roundhouse. As a rule the drop pits are in bad condition as to drainage and condition of brick work. There is generally a lot of water standing in them, and the bad condition does not make it a proper place to do repairs. The ventilating stacks of a roundhouse are generally built of metal and are easily eaten by the gases from the engines. I would change this. I would state that the New York Central have adopted a stack that will last. It is built of wood. Gases cannot eat it, and it lasts a great many years in good condition. The gentleman before me has referred to the want of more light in the night time. I would add to that suggestion the need of having more light in the day time. Generally, roundhouses in the day time are too dark to have work properly done. I think improvements ought to be made in these directions.

The President.—I think Mr. Mackenzie struck the keynote, that if we make these things plain to our management that we will get them. The trouble is that we are too timid. I think that is one of the failures of the heads of motive power departments that they do not make their case strong enough in asking for these things. "They have answered the purpose so long, why can't you continue?" If it is presented to our managements in a light that we are able to do it, we have grounds and evidence to prove that these things would be an advantage. I do not see how they can refuse them.

Mr. Martin.—About 10 days ago I happened to be in Altoona. While there I took a trip through the Pennsylvania shops at Altoona and Juniata. A short time ago the Pennsylvania Railroad used light engines. I inquired how they overcame the fact of their roundhouses being too small for the large engines they are now using. I was taken to the roundhouse where I saw they had used corrugated iron to extend toward the turn-table. They have replaced the inside brick wall with iron posts. To free the roundhouse of smoke and gas, they use a large stack that fits over the engine stack; this is connected with a blower system that keeps the house free of smoke and gas.

Mr. Macbeth.—My purpose is to back up the arguments of our able President in regard to making a request for what we desire and enforcing the same before our superior officers. When a person visits the engine houses of the present date and takes notes of the condition of affairs in general and the method of handling heavy materials, it would appear to me that some of the motive department men should fully realize the

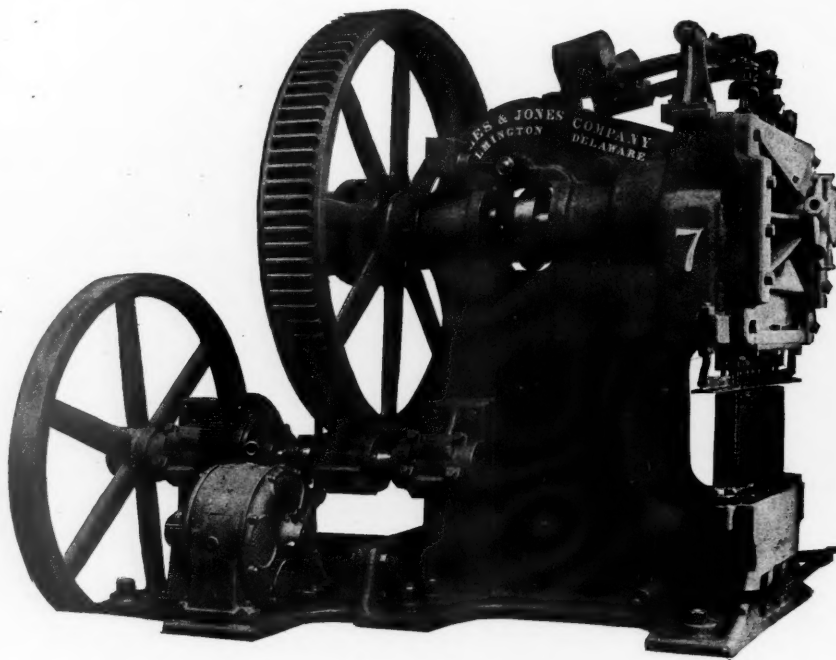
importance of this. I fully agree with Mr. West, when stating that if any of them were forced to do so they could easily procure all the tools that are necessary. A trolley starting from the dome to the front end of engine in a "Y" shape should be in use in every engine house with an air hose to handle the material with 80 per cent. less cost than is required at the present date. Sufficient lights are another necessity in the engine house. What a great saving it would be if incandescent lights were in so they could be carried to any part of the pit or side of the locomotive. It is very evident that the representatives of the motive power departments should get together on the subject with a view of improving the present method.

Mr. Miller.—I think, as has been said here, that if our higher officers could understand the conditions as they are, that better facilities would be provided for taking care of and handling the power quickly. We certainly must have different arrangements from the old methods to meet the present conditions of increased weight and capacity of engines. We must be able to handle more coal in less time; we must handle

#### New Punching Machines by Hilles & Jones.

Among other machines recently brought out by Messrs. Hilles & Jones are two special punching machines for work on steel cars, etc. The illustration is of a machine with sufficient capacity to punch 15 holes  $\frac{3}{4}$  in. in diam. through  $\frac{3}{4}$ -in. material, or corresponding duty. One of the special features to be noticed particularly is the very high cast steel die block which allows angles, Z bars and other shapes to be conveniently handled. There are 15 punches and dies in position, but, of course, this number may be varied to suit the work to be done. The punches are set in two parallel rows, which allows a T-shaped stripper to be placed between them. The unusual vertical opening of the jaw also makes possible the use of special punching or shearing fixtures. Driving is by an electric motor connected through cut gears and friction clutch.

A smaller machine is another special punch designed for handling light structural shapes. The die block is also of cast steel and is 20 in. high. There are three punches and dies in position, held at positive centers, and



A New Punching Machine by Hilles & Jones.

more cinders in less time; we must handle more engines in and out of the house to meet the requirements. We have helped ourselves out in a good many ways. For instance, in the drying off and the sanding of engines. Mr. Mackenzie designed a sand drier, which is an extension to the boiler in sand house, that supplies hot water for washing out and filling boilers in the roundhouse. The waste heat, from this boiler, is run through a hopper or extra boiler, which the sand passes through and the sand is heated without any additional expense, and then is elevated by air into a tank and from there fed into the engines by gravity. We handle our coal in small dump cars off a platform, some 15 or 16 ft. high, and under favorable circumstances we handle coal at about 5 cents a ton, but when the coal comes in frozen in the cars, or when it is unloaded on the platform and freezes, it costs from 8 to 10 cents per ton. Then another thing, these iron cars we are getting now; these large 80,000-lbs. capacity cars; men are not able to shovel out of them to the advantage that they do out of the 40,000 lbs. capacity wooden cars, on account of the rows of rivets and seams in the bottom catching the shovels, and the height that they have to throw over.

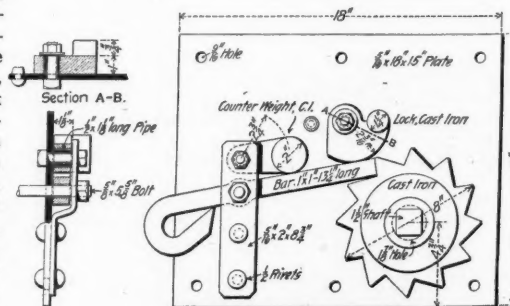
As to the light in the roundhouses, we cannot get too much. I am glad that has been emphasized. You will notice in the committee report we recommend arc lights for the general lighting of roundhouses, and the incandescent lights for use in fire-boxes and about the locomotives. We recommend the engines being headed into the house and a 10-ft. space between the wall and the engine, as it gives room to handle the machinery where the work is needed. We want good drop-pits. There is no occasion for non-sanitary conditions such as Mr. Bartlett has spoken of. The handling of steam chests and covers we do with a small crane that one man can hang up on a smoke-stack. A blacksmith can make it in a couple of hours and it saves a great deal of labor. We use a frame to place on the running-board and clamp to the hand-rails to raise and lower the  $9\frac{1}{2}$ -in. air pumps. A great many of those things can be easily provided for and very much facilitate the handling of work. But when you bring engines in covered with snow or ice, and they are wanted to return to service in 30 minutes or an hour, to get them thawed out so the machinery can be inspected and the bearings oiled, needs something more than most of our houses have at the present time. We should have hot air come in under the engines. In the pits there should be hot-air blasts coming up so that when an engine comes in the blasts can be opened and a heavy volume of hot air put onto the locomotive.

each punch is controlled by a gag so that any one can be used as desired. With this type of machine it is often desirable to have different sizes of punches in the different stocks so that all of the holes in a plate or bar can be punched at one passage through the machine, by using the different gags as needed. In addition to the gags there is an automatic arrangement to stop the head at any desired point in its stroke. Driving is by electric motor, but pulleys or steam engine may be substituted if preferred.

#### A Ratchet for Door Chains of Hopper Cars.

We have received from Mr. W. I. Mann, Mechanical Engineer for Laughlin & Co., Pittsburgh, Pa., a blueprint from which the accompanying illustration of a ratchet for door chains of hopper cars is made. This device was made for use on the company's own cars and it has been applied to over 100 cars and used for about three years. It has worked very well, and, as the drawings show, it is very simple.

In winding, the cam is thrown off and the counterbalance keeps the pawl in action. When the doors are to be dropped the counterbalance is first thrown to the



left, where it pivots at the top as shown. Then, when the cam is turned and the pawl lifted, the counterbalance weight keeps the pawl clear of the ratchet teeth.

The device is not patented, and, as we are informed, it can not now be, and it is here shown as a clever device which may serve the purpose of some of our readers. It was designed by Mr. William F. Rust, under the direction of Mr. Mann.



## Train Accidents in the United States in July.

EDITOR'S NOTE.—As explained in another column, the *Railroad Gazette* monthly train accident record is now and hereafter to appear in a form somewhat different from that heretofore used. The rule to publish accounts of all train accidents which cause personal injuries will be changed, and cases in which injuries are few or slight and the money loss is apparently small, will usually be omitted from the list, thus making it materially shorter. The tabular statement of totals will be omitted entirely, as a more complete report of the total number of accidents occurring will probably be published by the Interstate Commerce Commission. As our record will probably contain fewer cases in each class, the separation of the classes is abandoned, and the whole of the accidents in each monthly statement will be given in one series, in the order of the dates of their occurrence; but the classification will be indicated at the beginning of each paragraph, by the use of the following

## ABBREVIATIONS

- rc Rear collisions.
- bc Butting collisions.
- xc Miscellaneous collisions.
- dr Derailments; defect of roadway.
- eq Derailments; defect of equipment.
- dn Derailments; negligence in operating.
- unf Derailments; unforeseen obstruction.
- unx Derailments; unexplained.
- o Miscellaneous accidents.

The third class, "xc," includes collisions (heretofore classed as "rear") due to trains breaking in two and the rear portion subsequently running into the forward one.

rc, 1st, 1 a.m., Union Pacific, Rock Springs, Wyo., eastbound passenger ran into a preceding freight; one engine, two passenger cars and five freight cars dented; 28 passengers and six employees injured, injuries mostly slight.

xc, 1st, Lake Charles, La., collision at the crossing of Southern Pacific and Kansas City Southern between a freight and a switching freight; one employee killed.

unf, 1st, Frankfort & Cincinnati, Switzer, Ky., passenger train ran into washout; one employee injured.

rc, 2nd, Chicago, Burlington & Quincy, Burlington, Iowa, a freight train stopped on the Mississippi River Bridge was run into at the rear by a following freight; caboose wrecked but bridge not damaged.

bc, 2nd, Cincinnati, New Orleans & Texas Pacific, Sunbright, Tenn., northbound freight No. 32, a double header, collided with a southbound work train; engines damaged. One employee killed and one injured.

xc, 2nd, 10 p.m., Norfolk, Va., passenger train of the Seaboard Air Line ran into freight of the Belt Line at the crossing of the two roads. All the passenger cars were derailed.

xc, 2nd, Monticello, Ind., Chicago, Indianapolis & Louisville passenger train struck Pittsburgh, Cincinnati, Chicago & St. Louis passenger train at crossing; one passenger car damaged; one passenger injured.

xc, 2nd, Pennsylvania, Newcastle, Pa., passenger train ran into freight cars left standing on main track; two passengers and five employees injured.

eq, 2nd, Pennsylvania, Portage, Pa., freight train derailed by broken truck and 29 cars ran off the track, many of them being wrecked.

dr, 3rd, San Antonio & Aransas Pass, Simington, Texas, freight derailed at defective switch; one employee killed.

un, 3rd, Indiana, Illinois & Iowa, Rugby, Ind., passenger train derailed; one employee injured.

xc, 4th, 10 a.m., Bound Brook, N. J., northbound passenger train of Philadelphia & Reading ran into westbound excursion of Lehigh Valley at crossing; wrecked three cars (empty) of L. V. train; P. & R. engine overturned. The P. & R. train was thrown off at the derauling switch, but was going so fast that it could not be stopped before striking the other train. One employee injured.

eq, 4th, Norfolk & Western, Lithia, Va., freight train derailed by broken axle; conductor and two other employees injured.

unf, 4th, Chicago, Milwaukee & St. Paul, Mosinee, Wis., freight derailed by sand on track; engine and five cars wrecked. One trainman fatally injured.

unx, 4th, Iowa Central, Geneva, Iowa, southbound passenger train derailed, mail car overturned and wrecked; three other cars badly damaged; two employees killed and two injured.

xc, 5th, Baltimore & Ohio, Mt. Pleasant, Pa., collision between passenger train and empty engine, due to misplaced switch. Two passengers and one trainman injured.

xc, 5th, Lake Erie & Western, Connersville, Ind., gravel train collided with some standing cars on a descending grade entering a pit; one car wrecked; one brakeman killed.

o, 5th, 3 a.m., Chesapeake & Ohio, Williamsburg, Va., locomotive of freight train wrecked by explosion of its boiler; one brakeman injured.

eq, 6th, Seaboard Air Line, Richland, Ga., tender, baggage car and mail car of passenger train derailed by broken wheel; two trainmen injured.

bc, 7th, Southern Pacific, Sisson, Cal., butting collision of passenger trains, wrecking three engines and two baggage cars; one tramp killed and engine man and one tramp injured. It is said that the northbound train was a special and the engine man forgot about the southbound. The conductor had taken action to stop the train when he saw the engine man's mistake, and succeeded in reducing the speed materially.

eq, 7th, New York, Ontario & Western, Cadosia, N. Y., freight train derailed by broken wheel and 38 cars of coal fell off a trestle and down a bank.

unf, 7th, Fonda, Johnstown & Gloversville, Sammons-ville, N. Y., passenger train derailed by running over a cow.

xc, 8th, Pittsburgh, Cincinnati, Chicago & St. Louis, Columbus, Ohio, passenger train No. 19 was run into by a switching engine which struck the third passenger car in the side. Two passenger cars were wrecked and seven passengers were injured.

dr, 8th, Cincinnati, Hamilton & Dayton, Hamilton, Ohio, passenger train No. 41 derailed at a defective

switch. The whole train, engine, tender, baggage car and two passenger cars, was overturned. Mail clerk and two passengers injured.

eq, 8th, 1 a.m., New York, New Haven & Hartford, Clinton, Conn., eight cars of a freight train derailed by automatic application of air-brakes.

eq, 8th, Pennsylvania, New Brunswick, N. J., a car in a freight train was derailed by a broken axle. The car fell against a passenger train passing in the opposite direction, damaging several cars and injuring one passenger.

unx, 8th, Manhattan Elevated, New York City, northbound passenger train on Second Avenue line derailed at Front and Moore streets, one car falling against a building.

unx, 8th, St. Louis South-Western, Jonesboro, Ark., work train running backward derailed, engine overturned; engine man killed, two trainmen and 10 laborers injured.

eq, 9th, Lake Shore & Michigan Southern, Nottingham, Ohio, a car in a westbound freight was derailed by the failure of a heated journal and fell across the eastbound track. A moment afterward eastbound passenger train No. 18 ran into the wreck and was badly wrecked, the whole train, except one sleeping car, falling down a high bank. At the foot of the opposite bank a dozen freight cars were piled up. The engine man and fireman of the passenger train and one passenger were killed; three passengers and three tramps injured.

bc, 10th, Chicago & Alton, Norton, Mo., butting collision between westbound passenger and eastbound freight, wrecking the front portions of both trains, including three passenger cars. The dining car and one passenger car were partly destroyed by fire. Two passengers and five employees were killed and 40 passengers were injured, 14 of them fatally. Two tramps were killed. This collision was reported in the *Railroad Gazette* of July 19. It is known that the engine man and conductor of the freight, who were killed, had decided to wait at Marshall for the passenger train, but they did not, and the reason why they changed their minds will never be known.

xc, 10th, New York Central & Hudson River, Buffalo, N. Y., an engine backing off the turn-table at Genesee street, ran into the engine of a passenger train on the main track, doing slight damage. The empty engine, having been reversed and deserted, ran unattended to Black Rock.

dr, 11th, New York, Chicago & St. Louis, Springfield, Pa., three cars of a local freight train, which had been stopped on a high trestle bridge to unload stone, fell, with the bridge, to the ravine below, and 10 men, mostly workmen on a culvert, were killed. The bridge, an iron trestle, was weakened by material for the culvert which was allowed to accumulate so as to produce undue pressure on the vertical members of the trestle. This accident was reported in the *Railroad Gazette* of Aug. 16.

dn, 12th, 2 a.m., Baltimore & Ohio, Boyd's, Md., passenger train No. 3 was derailed at a misplaced switch; one postal clerk injured.

unx, 12th, 8 p.m., Union Pacific, Rock Springs, Wyo., the rear truck of a sleeping car in a passenger train was turned into a side track by a defective or unfastened switch, and the car, together with a freight car and the station platform, was damaged. One passenger was injured.

xc, 13th, Weatherby, Mo., fast freight of the Chicago, Rock Island & Pacific ran into passenger train of Omaha, Kansas City & Eastern, at crossing, damaging both engines and several cars. One passenger killed, three trainmen injured.

bc, 15th, Ohio River road, Paden's Valley, W. Va., butting collision between eastbound passenger train and westbound empty engine, wrecking both engines and the baggage car; two trainmen killed, three injured, one fatally. In reading the time-table, the engine man of the empty engine overlooked the express. It is said that he was not familiar with the road.

xc, 15th, 2 a.m., Delaware, Lackawanna & Western, Gouldsboro, Pa., butting collision in yard between two engines, both moving backward; one fireman killed and three other employees injured.

unf, 15th, 11 p.m., Kansas City Southern, Poteau, Ind. T., freight train broke through bridge weakened by fire; tender and five cars wrecked. One trainman injured.

bc, 16th, Hocking Valley, Vinton, Ohio, butting collision between a pay train and a freight, wrecking both engines and several cars. One trainman killed, five injured.

bc, 16th, Missouri, Kansas & Texas, Wymark, Ind. T., butting collision of freight trains on bridge over Arkansas River. Both engines fell to the river and the wreck of the bridge and of several cars was piled on top of them. The wreck took fire and was mostly burned up. It is said that a telegraphic order given to one of the trains was misread. Three trainmen and two tramps killed; three trainmen injured.

bc, 17th, Baltimore & Ohio, West Union, Va., butting collision between freight train and work train, wrecking both engines; six trainmen injured.

bc, 17th, Gower, Kan., butting collision between passenger train No. 101 of the St. Joseph & Grand Island and freight No. 46 of the Atchison, Topeka & Santa Fe, badly damaging the engines and several freight cars. The passenger train was pushed back about 400 ft. without being derailed. Oscar Smith, a trackman, was at work near the scene of the collision and succeeded in nearly stopping the passenger train, but was unable to attract the attention of the engine man of the freight. Two trainmen killed, six passengers injured. The engine man of the freight had disregarded an order to stop at Frazier.

unf, 17th, Denver & Rio Grande, Gunnison, Colo., freight train broke through bridge weakened by fire; bridge and 10 cars mostly burned up.

bc, 18th, Louisville & Nashville, Nortonville, Ky., butting collision due to mistake in orders. Both engines and several cars were wrecked; one trainman killed, two injured.

dn, 18th, Atchison, Topeka & Santa Fe, Emporia, Kan., a work train moving backward was derailed by the overturning of a derrick car, the derrick having become loose and swung to one side while passing a curve. Three employees killed, one injured.

rc, 19th, Pittsburgh, Cincinnati, Chicago & St. Louis, Knightstown, Ind., freight train ran into rear of preceding freight; engine overturned, caboose and six cars wrecked and 10 other cars damaged.

xc, 19th, Cleveland, Cincinnati, Chicago & St. Louis, Crawfordsville, Ind., collision of freights at a meeting point, the eastbound train being struck by the westbound before it had cleared the main track; one trainman killed.

xc, 19th, Pennsylvania, Conestoga, Pa., westbound freight broke in two; rear portion ran into forward one, wrecking 11 cars, blocking five tracks.

xc, 19th, St. Louis Southwestern, Texarkana, Ark., a

work train on which there were a number of laborers broke in two; rear portion ran into forward one; 40 workmen injured.

unx, 21st, 2 a.m., Northern Central, York, Pa., a car in a freight train was derailed near a bridge, and, running on the bridge, fell off at the side and, with 13 other cars, was wrecked. One brakeman injured.

unx, 22nd, Illinois Central, Henshaw, Ky., a train of empty passenger cars was derailed. Six of the cars were overturned and fell into a fire where old sleepers were being burned, and the cars were completely destroyed.

bc, 23rd, Missouri Pacific, New Haven, Mo., butting collision of freight trains; 23 cars wrecked, several of them being destroyed by fire. Two trainmen killed, one fatally injured.

unf, 23rd, Texas Central, Albany, Texas, freight train derailed at a washout. Fireman killed; engine man and one brakeman injured.

unx, 23rd, Denver & Rio Grande (narrow gage road), Marshall Pass, Colo., the rear car of a passenger train, a sleeper, was derailed and fell down a bank. The car was completely overturned and lodged right side up. Twelve passengers were injured.

xc, 24th, 1 a.m., Chicago, Rock Island & Pacific, Tiffin, Iowa, a westbound passenger train running through a side-track to meet an eastbound passenger train was not properly controlled, and ran into the latter, overturning a sleeping car, a dining car and one other passenger car. Ten passengers slightly injured.

xc, 25th, Boston & Maine, near Springfield, Vt., passenger train ran over misplaced switch and collided with empty engine; one employee injured.

dn, 26th, 2 a.m., Choctaw, Oklahoma & Gulf, Palestine, Ark., freight train derailed by misplaced switch. Engine and seven cars wrecked; engine man and fireman killed, one brakeman injured.

unx, 26th, Baltimore & Ohio, Marriottsville, Md., engine of passenger train derailed and overturned; engine man killed, fireman injured.

unx, 27th, 3 a.m., Southern Ry., Marshall, N. C., passenger train No. 25 derailed. Engine man killed, fireman fatally injured, two passengers injured.

o, 28th, Chicago, Rock Island & Pacific, Hamblin, Kan., four cars in a freight train were blown off the track by a cyclone and lodged about 60 ft. to one side.

xc, 29th, Chicago & Northwestern, Highwood, Ill., collision between freight train and work train, wrecking engines and 10 cars. One laborer was killed and nine injured.

o, 29th, Delaware, Lackawanna & Western, Nayaug, Pa., locomotive of freight train wrecked by explosion of its boiler. One brakeman killed, fireman injured.

dr, 30th, Wheeling & Lake Erie, Adena, Ohio, freight train derailed by broken rail. Two trainmen killed.

unf, 30th, Chicago, Rock Island & Pacific, Kremlin, Okla. T., northbound passenger train derailed, while running at full speed, at a culvert which had been weakened by a flood; baggage car and first two passenger cars overturned. One passenger sitting on car steps killed; 24 other passengers injured, most of the injuries being slight.

unx, 30th, Southern Ry., Asheville, N. C., freight train derailed. Fireman killed.

## American Bar Iron in Australia.

As many complaints have been made to this consulate regarding the quality of bar iron shipped from the United States to the Australian States, I addressed a letter to the leading importers requesting definite particulars, and received the following reply from one of the largest dealers in iron in the city of Melbourne:

The abnormal rise in the price of British bar iron at the beginning of the year 1900 furnished the opening for the introduction of American iron to the Australian market. The American prices continued to fall, owing to internal competition, and orders were diverted from the markets of Great Britain to those of the United States. The American mills missed their chance, and instead of doing all in their power to secure the business of the Australian merchants for future requirements, evinced little interest in the orders they received, took their own time for delivery, and, instead of giving attention to the overseas demand, considered the home trade, which was already secured, first. They failed in every instance to comply with the requirements of the importers on this side, and followed their own will to their ultimate disadvantage. To add to the trouble thus created, the agents of the various New York shipping firms, anxious to secure freights and knowing little and caring less of the quality of the bars shipped, based their cost, freight, and insurance price on the cheapest rate for any quality of iron, and obtained large orders from Australian importers, the bulk of which have given great dissatisfaction. The result is that the American bar iron is not liked in Australia, its want of popularity being entirely due to the indifference of the American manufacturers.

There is one way in which the United States may rehabilitate themselves, and that is by holding large consignments in both Sydney and Melbourne, satisfying the buyers that the American mills are honestly anxious to meet the Australian requirements, and meeting all British and other foreign competition. Strict integrity must be observed in the fulfillment of all contracts, and if every other care is taken, it is yet possible for the United States to retrieve their position and command these markets; and as the trade of the commonwealth will increase by leaps and bounds, it follows that in a few years the market here will be a very solid factor to be considered in the American export of bar iron.

Some points will of necessity have to be conceded, and among them are the faultless rolling of all bars and the throwing out of all bad ones. The tariff for extra sizes must conform to the British tariff. Bundles of bar iron must be made up in exactly 56 and 112 pounds, respectively, where so ordered, and the lengths must be within the limits named, even if the exact weights have to be made up with small pieces. This is necessary to avoid weighing each bundle. There will have to be strict uniformity in stocks, and prices must be kept within the limits of the British rates. Given these conditions, and large stocks held in stores in Melbourne and Sydney in the hands of a responsible representative, concessions in transport to other and smaller states, and uniform quality and rolling guaranteed, there will be an opportunity for the United States to obtain the trade and control the market of the Australian commonwealth.

JOHN P. BRAY,

Consul General.





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At 32 Park Place, New York.

#### EDITORIAL ANNOUNCEMENTS.

**CONTRIBUTIONS**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**ADVERTISEMENTS**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

Quite the most interesting thing now going on among the railroads is the effort of the Wabash to get into Pittsburgh. Some account of the situation may be found on another page of this issue, but obviously it is not easy to know the exact situation. The strategy of the campaign is complicated and the struggle is hard, and those who are in a position to know are not at liberty to tell. The latest story is that the Pennsylvania Railroad is going to use the Western Union, and its privileges along their right of way, as a club to compel the Gould interests to sell out the Wabash and Wheeling & Lake Erie properties. This is denied, with the obvious reminder that the Western Union has long term contracts with the roads.

We lately printed an unusual document which has probably escaped the attention of a number of our readers who would like to see it, and for that reason we speak of it again. That was the address of Mr. Mansergh, which may be found on page 635 of our issue of Sept. 13. It was his address at the opening of the Engineering Congress at Glasgow, he being the President of the Institution of Civil Engineers and having presided at the International Congress. The address is worth reading for its English alone as an example of a clear, simple and dignified style which is somewhat rare now among professional men, and especially among those who live within the atmosphere of the daily newspapers. But beyond that, the conception of the engineer's place in civilization is very fine, and the notion of what an engineer is, and must, be, is just and should be especially stimulating to young engineers. Mr. Mansergh conceives of engineers as being "more than a profession; they amount to a race, and it is upon them more than upon any other class of the civil population of the world that falls the heaviest share of the white man's burden." He speaks of the difficulty of defining the engineer, which comes partly from the fact that engineering "does not consist in being but in doing." Mr. Mansergh mentions an American definition of an engineer, which states that "he is a man who can do well for one dollar things that anybody could do somehow for double the money," and he says very justly that "real engineering must be mastered as it is realized on works in progress. . . . The working engineers' library is sometimes largely composed of ephemeral manufacturers' catalogues and lists of prices current of materials. . . . If he starts with aptitude, plods on with patience, observes with insight, records with careful exactitude and adapts with wisdom, in the fullness of time he will find himself, almost to his surprise, in possession of judgment, and that is the glory of an engineer fitting him for his highest employ as man of all work of civilization.

#### Emergency Brake Tests.

Last year, in reporting the rack tests of Westinghouse and New York triple valves made for the Railroad Gazette, at St. Louis, Mo., an interesting fact was brought out for the first time in connection with the so-called "jumping tests"; that is, the action of brakes in emergency applications with groups of triples cut out.

In the St. Louis tests with Westinghouse triples, quick action was got with five cars cut out immediately behind the tender, and quick action would jump groups of three cars cut out in the middle of the train, or ten cars cut out just ahead of the last car of the train.

After some study, it was concluded that this was due to the train pipe having a dead end at the rear. The explanation was that with cars cut out near the middle of the train, the effect of the train pipe reduction, made by the triple just ahead of the gap, was lessened by having a large volume of air in the train pipe beyond that triple. With cars cut out at the rear of the train, there was a smaller volume in the train pipe beyond the last working triple, and hence a more effective lowering of the train pipe pressure than if the same action took place in the middle of the train. This action had never been accurately noted before the St. Louis tests, but since then it has been observed in connection with rack testing at Purdue University.

Jumping tests with Westinghouse triples were made during the past year on the M. C. B. brake rack at Purdue with 30-car trains, using a 70-lb. train line pressure and 8-in. piston travel. The results in general are the same as those got at St. Louis. Quick action could be got through groups of three cars cut out at the head end or throughout the middle of the train, but not through groups of four. Further quick action could be got through nine cars cut out ahead of the thirtieth car, but not through ten cars cut out. These tests were made especially to show the action of the brakes in emergency applications with cars cut out.

The latest information on this point is given by the report of the M. C. B. committee on triple valve tests, presented at the last convention at Saratoga. In making rack tests at Purdue with Hibbard triples, arranged as in a train of 50 cars, it was found that quick action could be got through but three cars cut out at the head end or in the middle of the train, and through seven cars cut out just ahead of the last car. The point, therefore, seems to be very well established that quick action will pass from two to three times as many cars cut out just ahead of the last car as in any other part of the train. The principal conclusions of the St. Louis rack tests have since been confirmed by road tests, although it is doubtful if the report of the road tests will ever be published.

#### English Trade Unions May Be Sued.

The railroad employees' brotherhood of England has suffered a pretty serious blow at the hands of the House of Lords, which, sitting as the supreme judicial body of the Kingdom, has decided that a trade union, though it may not be criminally punishable for injuring a person's business, is liable to damages in a civil suit, and may be made the subject of an injunction, the same as though it were a corporation. Thus, if the officers of a union are responsible for a boycott or other unfair measures to injure an employer or other person who refuses the demands of the union, the funds of the union, if it have any, are liable to be attached in a damage suit at the hands of the injured party. In the case at bar there was no suggestion of violence or crime, nor of breach of contract; the injunction was against acts designed to prevent outside men from interfering with a strike. Up to the time of the two decisions embodying these principles trade unions in England had enjoyed about the same immunities that they do in this country.

While the English trade unions, with their large insurance and benevolent funds, will thus find their liberty of action very materially restricted, we do not exactly understand the somewhat jubilant tone in which it is claimed, in some quarters, that the doom of trade unions is now sealed. *Herapath's Journal*, taking as its text an article by Mr. Frederic Harrison in the *Positivist Review*, publishes an editorial headed "The End of Trade Unionism," and Mr. Harrison seems to think that if, with the easy access which he assumes that they now will have to the funds of the brotherhoods, the powerful railroad companies cannot "smash up the great unions," they will be false to their past reputations. And he warns the officers of the trade unions that in their future wars against employers they had better be very careful not only to refrain from damaging anyone's business, but from inconveniencing any interest, or even doing things to make it unpleasant for the employer.

Ever since the enactment of the law of 1875, which

legalized trade unions, the officers of these bodies have justified their actions largely by the dicta of the famous case of *Allen vs. Flood*; but it is pointed out that that suit was not parallel to the present cases; it simply decided that the injury, by one man, of the business of another, even though due to malicious motives, was not necessarily subject to an action at law. The two present decisions are in the cases of the Taff Vale Railway, growing out of a strike on that road a few months ago, and of *Quinn vs. Leatham*.

Mr. Harrison explains the action of the House of Lords by attributing to that body a change in spirit, due to the increased taxation and other burdens now resting on the English people in consequence of the war to subjugate the Boers in South Africa. The House of Lords is "naturally inclined in favor of the interests of property and power," and the present economic situation accentuates that attitude.

If English labor leaders are any like those of this country, it seems to us that their doom may be yet a good way off. If we may judge by the past a good deal of annoyance may be inflicted on an employer by mere trickery, the punishment of which by a suit at law, either civil or criminal, is exceedingly difficult. Again, a labor union, when managed with intelligence and honor, can wield enormous power without transgressing just laws. Mr. Arthur has done great things for the locomotive engineers of the United States, but he has rarely, if ever, done anything that would imperil the accumulated funds of his brotherhood, howsoever easy the law might make access to those funds by the courts.

*Herapath's* and Mr. Frederic Harrison agree that the management of the workmen's unions of England is not so intelligent and honorable as it was 30 years ago. To one who has based his views on the published history of labor disputes in the manufacturing field in England this is somewhat surprising, for we have been told that the relations between employer and employee appeared to be improving slowly. If there is good ground for this conclusion, if employers are really finding an advantage in having a strong union to deal with—instead of the former weak or vacillating union—they ought to look with regret on a decision which is likely to impoverish the unions' treasuries. It is quite possible, of course, that the experience of English manufacturers may throw but little light on the problems of the railroad service.

#### Annual Reports.

**Chesapeake & Ohio.**—This company, operating 1,507 miles of road, and earning a gross revenue last year of \$15,372,000, has in recent years always issued one of the most interesting reports, because of the special conditions governing the company's operations. Despite certain disadvantages in competition for through traffic to the coast, its competition in grain tonnage was for a time keenly felt by the trunk line roads. This item has become less important and the soft coal industry now furnishes the company with 50 per cent. of its tonnage. In previous years much of the benefit through the increasing tonnage was each year lost through the progressively lower rates. By 1899 these had fallen to the extremely low figure of 2.21 mills per ton-mile on coal business, and to 4.37 mills on all freight—perhaps the lowest average rates reported by any railroad in this country. Only very keen attention to operating economies could have maintained solvency on such rates, yet gross and net earnings have shown continued gains since 1894.

In the year to June 30 last the company's development proceeded more rapidly in all the particulars which have made its operations so peculiarly interesting, than in any previous year. In gross earnings the year's enhancement was \$1,970,000, or 14 per cent., on top of a gain of \$1,392,000 in 1900, and smaller gains in previous years, back to 1894. Most of the year's enhancement in revenues was from freight traffic, the gain in that department being \$1,747,000, and the extent of this gain, 17 per cent., is more largely attributable to better average rates than to increase in tonnage.

Comparison of the main items of the income accounts of the last three years to June 30 follows:

	1901.	1900.	1899.
Average miles.....	1,506	1,476	1,445
Freight earnings.....	\$11,842,213	\$10,095,144	\$9,062,876
Passenger earnings.....	2,826,813	2,681,076	2,422,032
Gross earnings.....	15,371,542	13,402,070	12,008,839
Operating expenses.....	9,565,880	8,706,785	8,077,384
Net earnings.....	\$5,805,662	\$4,695,285	\$3,932,455
Total income.....	5,995,587	4,843,656	4,032,612
Bond interest.....	3,160,093	3,061,293	3,236,481
Taxes.....	401,300	380,853	419,321
All charges.....	3,953,690	3,687,074	3,745,803
Imp. and equipment.....	1,304,172	348,696	.....
Balance.....	\$697,725	\$807,886	\$706,130
Dividends.....	605,288	605,278	.....
Sundry accounts.....	90,454	52,612	.....
Surplus.....	\$2,083	\$150,096	\$706,130

Gains in receipts, not only in 1901, but for a series of years, have been due to an unusual extent to additions to freight revenues. Between 1894 and 1901 the enhancement in gross receipts was \$6,327,000, but of this passenger receipts yielded only \$815,000. This trend of receipts has fixed the character of the development of the property and has called for exceptional efforts to improve the physical condition, to secure additional facilities in terminals and in equipment to move the heavily increased tonnage and to promote operating efficiency. The extent of the betterment in physical condition cannot be gone into at this time, but the additional traffic facil-



ities required can be indicated in part by certain comparisons, which are facilitated by the unusual variety of information bearing on the condition of the company's property to be found in its reports. As regards equipment and carrying capacity, for instance, the following record is interesting:

	Freight cars.	Tonnage capacity.	Tonnage capacity per car.
1890 .....	9,572	214,299	27.39
1895 .....	13,258	334,931	25.26
1901 .....	18,511	572,440	30.92

1901 over 1890... 8,939 358,141 8.53  
P. c. increase.... 93 170 29

Changes in the character and number of locomotives since 1896 are shown below:

	1896.	1901.
4, 6 and 8 wheel switching.....	36	45
8-wheel passenger and freight.....	78	59
Mogul.....	2	...
10-wheel passenger and freight.....	116	113
Consolidation.....	123	186
Total.....	355	403

In 1896 an average of \$1,176 per engine was spent for repairs, while in 1901 the amount was \$1,441 per engine, or 18.7 cents per engine-mile against 15 cents per engine-mile in 1896. Repairs per freight car were \$52 in 1901 against \$44 per car in 1896. Maintenance of way cost shows corresponding large expenditures, the charges in 1901 being over \$1,470 per mile of operated road. Increase in expenses is, in fact, almost altogether accounted for by the enlarged cost of maintenance items. Division of operating expenses for the last three years will indicate how large a proportion of the expansion in operating cost is on this account.

	1901.	1900.	1899.
Maintenance of way.....	\$2,217,761	\$1,865,414	\$1,613,867
Maintenance of equipment.....	2,253,307	1,909,241	1,708,247
Cond. transportation.....	4,844,375	4,086,310	4,100,926
General.....	250,437	245,820	235,022

Total expenses.....\$9,565,880 \$8,706,785 \$7,658,062

The largest increase in maintenance of way charges in 1901 was in cost of rails \$235,650, against \$106,600 in 1900, while extraordinary expenses, not specified, but presumably repairs of track damaged in the spring floods, in the soft coal districts, were \$104,000 larger than in the previous year. The increase in cost of rail was on account of purchase of 100-lb. rails. Of these, 14,038 tons were laid in track last year, against 3,342 tons in 1900, when this weight of rail was first used. The company now has 159 miles of main line and 118 miles of second track laid with this section. Building of sidings and second track accounts for some of the company's recent large expenditures. Sidings now amount to 551 miles of trackage (for 1,507 operated miles), against 485 miles in 1898 and second track to 129 miles, from 97 miles in 1898. In 1901, in fact, though the increase in second track completed, over the 1900 mileage was small, \$1,111,145 was spent on 50 miles of double track, with \$150,000 more as the estimated cost to complete this work.

This expenditure was charged against capital, as was \$1,334,000 cost of the Richmond track elevation and station, and \$574,400 for 30 miles of new branches, while \$1,393,300 was spent for completing other new lines, on which separate bond issues were authorized.

The heavy special appropriation out of the year's income was spent chiefly for locomotives, \$638,276; freight cars \$196,478, and for other equipment, including a car float and partial payments on a new steamer, \$139,000 altogether. The cost of 16 miles of sidings, \$105,900, and excess cost of second track work over bond issue, \$352,381, with other betterment work absorbed the remainder of the special appropriation of \$1,304,200.

The changes in transportation results are deserving of special notice. President Stevens summarizes them by pointing out that "there was an increase in coal and coke tonnage of 15 per cent., and a decrease in other freight of over 6 per cent., the combined tonnage (10,125,497) showing an increase of 4 per cent. Revenue ton miles increased 3½ per cent.; revenue per ton per mile was 3.88 mills, an increase of 13 per cent.; the train revenue per mile was \$1.98, an increase of 18½ per cent. The average trainload was 511 revenue tons, an increase of 4¼ per cent.; including company's freight it was 533 tons. Miles run by freight trains decreased 1½ per cent. There was an increase of 3¼ per cent. in the number of passengers carried; and the revenue per train per mile was \$1.20, an increase of 3.4 per cent."

With this increase in traffic moved it will be noted that the expansion in transportation expenses in 1901 was only \$158,000; but the cost of locomotive fuel and enginemen's wages alone increased \$166,000. The increase in traffic movement, 104¼ million ton-miles, brought the total to 3,051 million ton-miles, which, of course, represents extraordinarily heavy tonnage movement on the 1,507 miles of road operated, of which only 129 miles is second tracked. Ton-miles per mile of road were, in fact, 2,025,000 in 1901, as compared with 1,350,000 ton-miles in 1896. Rates are still extraordinarily low, 2.72 mills per ton-mile on coal, 5.25 mills on freight other than coal, and 3.88 mills on all traffic.

The average revenue trainload has now risen to 511 tons, and the total trainload in 1901, including company freight, was 533 tons. This latter figure has not been reported previously, but the addition to revenue trainload was 23 tons in 1901. This increase followed an addition of 63 tons in 1900 and steady additions for a series of years. Even last year, with the addition of 104 million ton-miles to freight carried, freight train mileage, light trains being included in the figures, decreased by 97,000 miles. In 1900, with the addition of nearly 441 millions to the ton mileage, increase in train mileage was only 152,000 miles. Double-headed freight

mileage increased considerably last year, however, from 459,000 miles to 706,000 miles, an increase of 54 per cent. Total engine mileage gained 370,000 miles, or about 3 per cent.

The handling of this problem of freight and train mileage, and the progress made, is one of the most interesting records of a similar nature on any railroad, and figures showing the development for a series of years are appended.

	Ton miles (000,000 omitted).	Freight train miles.	Revenue train load.
1901 .....	3,051	5,969,060	511
1900 .....	2,947	6,044,600	488
1899 .....	2,506	5,891,800	425
1898 .....	2,513	6,638,200	379
1897 .....	2,000	5,684,800	352
1896 .....	1,836	5,649,400	325

Freight revenue. Ton-mile rate. Freight train mile revenue.

	Freight revenue.	Ton-mile rate.	Freight train mile revenue.
1901 .....	\$11,842,313	.0388c	\$1.98
1900 .....	10,095,100	.0362	1.67
1899 .....	9,062,900	.0343	1.54
1898 .....	9,263,000	.0370	1.40
1897 .....	8,389,400	.0419	1.48
1896 .....	7,810,600	.0426	1.38

**Chicago Great Western.**—After several years of expanding earnings, this company, in its report for the year to June 30, shows some decline in the amount of gains in gross and a comparative loss in net receipts. Miles operated were unchanged at 930, and with receipts of \$7,546 per mile in the year, aggregate income rose to \$7,013,860, against \$6,721,037 in 1900. Operating expenses were 68½ per cent. of receipts, and net earnings after taxes were \$1,978,346, a loss of \$48,468 from last year's net. Gross and net earnings (before taxes) for a series of years appear below:

	Gross earnings.	Net earnings.
1901 .....	\$7,013,862	\$2,182,346
1900 .....	6,721,037	2,230,814
1899 .....	5,867,739	1,924,223
1898 .....	5,386,043	1,608,671
1897 .....	4,680,859	1,253,271
1896 .....	4,709,520	1,399,577

The increases in earnings were in spite of losses in average rates, the lower rates being notable in view of the general improvement to be found in the annual reports now coming to hand. Ton-mile rates fell off from 7.2 mills to 6.4 mills, a loss of 11 per cent., while passenger-mile rates fell more moderately, 1 per cent., from 2.03 cents to 2.01 cents. No comment is made on the causes leading to the decline in rates and statistics are published showing the classification of tonnage moved. It is commonly reported that the company was an active competitor in hauling Kansas wheat to Minneapolis mills to supply the shortage in the spring wheat harvest. Whatever the cause, Chicago Great Western last year reported a large increase in ton-miles, 126½ millions, or 18 per cent. With this heavy addition to the service performed, the officers are able to report a decrease in freight train miles of 1½ per cent. The average trainload was increased by 52 tons, or 20 per cent. The trainload is now 313 tons, against 261 tons in 1900. The earnings per freight train mile show an increase over the previous year's figures, despite the drop of 11 per cent. in average freight rates. Freight train mile revenue was \$1.99 in 1901, and \$1.89 in 1900.

Important changes in capital were made in the year, \$5,145,600 4 per cent. debenture shares being sold, as well as \$600,000 preferred shares, and with part of the proceeds the company retired \$2,828,000 car trust liabilities drawing 5 per cent., 6 per cent. and 7 per cent. interest. In addition, the company expended of these capital funds, \$627,093 for rolling stock purchased; \$748,136 for real estate, additions and improvements, and \$102,952 for additional terminals in Kansas City.

Besides the prosecution of the improvement and development of existing lines, plans have been completed in the year for important extensions, which will give the company new through lines to Sioux City and Omaha. This is to be accomplished by purchase of the Mason City & Fort Dodge Railway of 92 miles, already carried through, the construction of two branches of 12 miles and 30 miles, to connect this line with the Chicago Great Western's present lines, and about 274 miles of extensions, to complete the lines to Sioux City and Omaha.

**Hocking Valley.**—The report of this company for the fiscal year to June 30 last is the second issued by the present company. Taken out of bankruptcy in 1899, the property has earned, in 1901, a surplus over fixed charges of \$1,354,200. Out of this 4 per cent. dividends on the preferred shares, calling for \$560,000, and a first dividend of 1½ per cent., \$156,324, on the common shares was paid. A heavy surplus was thus carried to profit and loss, which account has a credit balance of \$1,579,646 from the company's two years of operations.

Over 46 per cent. of the revenue is from hauling coal, and 35 per cent. more from other freight. Receipts from the latter source showed a decrease last year, however, by the gain in coal revenues, \$120,000. But changes in revenue assume a secondary position of interest to the operating statistics in which the company reports some of the highest averages of any road in this country, doing a general business. Thus its average trainload, 645 tons in 1901, is the highest figure of any company so far reporting for the past year. On the main line the average is reported as 686 tons, the low figure on the river division, 194 tons, reducing the average on the whole line to the figures given above. The company reports the freight train load, not the engine load. Though the average ton-mile rate was but 4.42 mills, against 4.48 mills in 1900, freight train-mile earnings were \$2.85. These records, it may be noted, are with but 25 miles

of second track on 347 miles of road, though to this might be added 38 miles of passing sidings and 22 miles of station tracks, but the tonnage movement is 2,400,000 ton-miles per mile of road. Most of the traffic moves, of course, at the convenience of the management, 61¼ per cent. of the total tonnage being soft coal; 8 per cent. more is coke, and a further 5 per cent. is ore. Merchandise is but 1½ per cent. of the traffic of 6,756,600 tons in 1901.

**Chicago & Eastern Illinois.**—With gross receipts of \$5,659,446 in the fiscal year to June 30 last, this company expended 57½ per cent. for operating expenses and a further 4 per cent. of receipts for taxes, leaving \$3,245,700 net operating receipts. The net income was sufficient to pay fixed charges; 6 per cent. dividends on the preferred shares and 5½ per cent. on the common shares, which are now on a 6 per cent. dividend basis. The surplus remaining was \$317,245, and this was subject to a deduction of \$250,452 for improvements, and the balance of \$66,793, was appropriated on account of depreciation of equipment, so that the whole year's income was appropriated under one account or another. The income statement shows considerable gains in revenue over the figures of 1900. In gross the increase was \$510,550, or 10 per cent.; in expenses, the increase was 13½ per cent. and in net receipts it was \$102,900, or nearly 5 per cent. In freight, the increase in ton-miles was 66½ millions to 917,171,000, or 7½ per cent., while passenger miles increased 4 millions, to 59,495,000, or by 7¼ per cent. This traffic is on 727 miles of operated road, so that both classes of traffic are heavy. In freight, the density of movement is measured by 1,260,000 ton-miles per mile of road in 1901, and passenger movement was 818,000 passenger miles per mile of road. Practically the traffic per mile is heavier than is indicated by these figures, because the company has two divisions, which are parallel for a long distance, and the freight movement is much heavier on one division, which is double-tracked for 107 miles. Moreover, though the company's main line runs from Chicago to the Mississippi River, 477 miles, the traffic is concentrated very largely on the 246 miles between the coal fields at Brazil, Ind., and Chicago. The heavy passenger travel is accounted for by the company's large suburban business in the Chicago district. This explains, also, the low passenger mile rate, as the preponderance of soft coal traffic accounts for the low average ton-mile rate. This was 4.93 mills in 1901, against 4.83 mills in 1900, and 4.85 mills in 1899. Passenger rates were also better last year at 1.63 cents per mile, as against 1.58 cents in the previous year.

Last year's increase of 7¼ per cent. in ton-miles was moved with an increase of only 58,877 in freight train miles. Freight train mile receipts ran up to \$2.40 in 1901, as compared with \$2.25 in 1900, and but \$1.89 in 1898, when the ton-mile rate was 5.12 mills. Average train loads rose rapidly. Over 20 tons was added to the average revenue train load, bringing it to the high figure of 487 tons. With this company freight train load is the total engine load. Including construction freight the total tons per freight engine mile was 513 tons in 1900. These figures compare with revenue and total train loads of 511 tons and 533 tons respectively in 1901, reported by the Chesapeake & Ohio, in which the total miles run by trains, whether loaded or light, are used as the divisor. Including double-headed engine mileage, Chesapeake & Ohio freight engine load in 1901 was 457 tons, but the company's reports do not specify whether the ton-mileage, as published, is the revenue tonnage or the total ton-miles moved. The record of the Chicago & Eastern Illinois, as set forth in its operating statistics, is an excellent one, both actually and relatively, to the reports of other companies. Its record in three important and related items of the train and traffic statistics is given below for a series of years:

	Ton-miles.	Freight train miles.	Revenue train-load.
1901 .....	917,170,600	1,881,600	487
1900 .....	850,501,300	1,822,800	467
1899 .....	750,399,300	1,510,800	414
1898 .....	660,143,100	1,788,700	369

This record has been established by special measures, besides physical improvements, larger equipment and new methods in the operating department. These special measures have involved the construction of a long extension from the company's old terminus at Shelbyville, in Central Illinois, to the Mississippi River at Gray's Point. One idea of the management, in completing this line, was to secure a more balanced tonnage movement, by creating a southbound traffic to load coal cars back. This extension connects by ferry with the St. Louis South-Western, and the route thus opened has some advantages in competing for traffic between Chicago and Texas points and other southwestern markets. The extension is having an important effect in reducing the proportion of empty car mileage, and this fact, with the larger train haul, has its obvious bearing on the train loading figures. The car mileage movement for the last seven years is appended:

	Loaded car miles.	Empty car miles.
1901 .....	41,042,900	24,018,800
1900 .....	37,967,800	24,345,300
1899 .....	34,652,900	23,411,100
1898 .....	31,904,700	21,364,600
1897 .....	28,994,400	20,714,200
1896 .....	27,447,500	19,632,900
1895 .....	24,411,300	16,922,800

The Mississippi River extension was completed near the close of the 1900 fiscal year, and the decrease in empty car mileage, reported in 1901, may, in large part, be attributed to the changed currents of travel which it



brought about. But the proportion of empty car mileage is still large, 37 per cent., and the large train load is all the more creditable.

#### July Accidents.

As the Interstate Commerce Commission, acting under the law passed last March, is now keeping a record of collisions and derailments on all of the railroads of the United States, and, presumably, will publish a periodical report of totals similar to that issued by the British Board of Trade, covering accidents in the United Kingdom, we have decided to discontinue the tabular record which we have kept for the last 28½ years; but the condensed narratives, giving date, name of place and brief details of the more important accidents, will be continued as heretofore; and that for July may be found in another column of this issue. In view of the probable complete character of the reports to be made by the Interstate Commerce Commission, we shall henceforth omit from our record a larger proportion than heretofore of the accidents which we find reported in the daily newspapers, aiming to include only those which are (1) fatal, or (2) injure a large number, or (3) are very costly, or (4) are of interest by reason of peculiar circumstances.

The eight most notable accidents in July are the following:

4th, Bound Brook, N. J.	11th, Springfield, Pa.
7th, Slason, Cal.	16th, Wyomark, Ind. T.
9th, Nottingham, O.	17th, Gower, Kan.
10th, Norton, Mo.	30th, Kremlin, Okla. T.

The most serious accident was that at Norton, Mo. Of this case we have no information of consequence, other than that which we print. In repeating the conviction, which we have expressed in connection with similar cases in the past, that the adoption of the block system is the only adequate measure of prevention with which to meet such disasters as this, we do not forget that the errors committed by the conductor and engineman in this case may, very likely, be guarded against, in the future, by more thorough enforcement of the regulations which are in force where the block system is not used. A determined superintendent might be able to adopt effective remedial measures without adopting the block

accident than a train accident. The details of this case have already been reported in these columns.

One of the most spectacular accidents of the month was that at Bound Brook, N. J. According to the reports the speed of the northbound train in this case was very high. At all events it was so high as to make the derail practically worthless. Signal engineers who like to discuss the question how far back from the danger point a derail should be fixed can probably secure some new data from this collision. For ourselves, we can see no adequate safeguard short of adopting the Coney Island scheme known as looping-the-loop.

The only accidents in which we find a report of fatal injury to passengers, besides that at Norton, are Nottingham and Kremlin.

Of accidents to electric cars in July the newspapers reported 27, in which six persons were killed and 127 injured. Those attended with fatal results were at New York City; Monson, Mass.; Birmingham, Ala.; Dayton, Ohio, and Danbury, Conn. In two of these a work train was involved, the Dayton case being the derailment of a work train, killing two men.

#### An Auxiliary Spring and Friction Device for Draft Gear.

So far designers have only tried to provide increased yielding resistance in draft gears by altering the whole arrangement of the pulling and buffing parts, and it is believed that an auxiliary spring and friction device which can be used in connection with any of the spring gears now in common use is a new departure. This is the principal idea involved in Mr. J. A. Hinson's latest draft gear which is about ready to be put on the market. Two forms of this auxiliary device are shown by the accompanying engravings, as applied to the ordinary M. C. B. rigging. It will readily be seen that it is applicable to any gear having a standard M. C. B. coupler yoke.

In Fig. 1 the increased yielding resistance is got almost wholly by a heavy elliptic spring, the only friction being that of the rollers and their bearings. In both pulling and buffing the action is the same. A movement of the coupler yoke forces the rollers up the inclined surfaces A A and this travel of the rollers

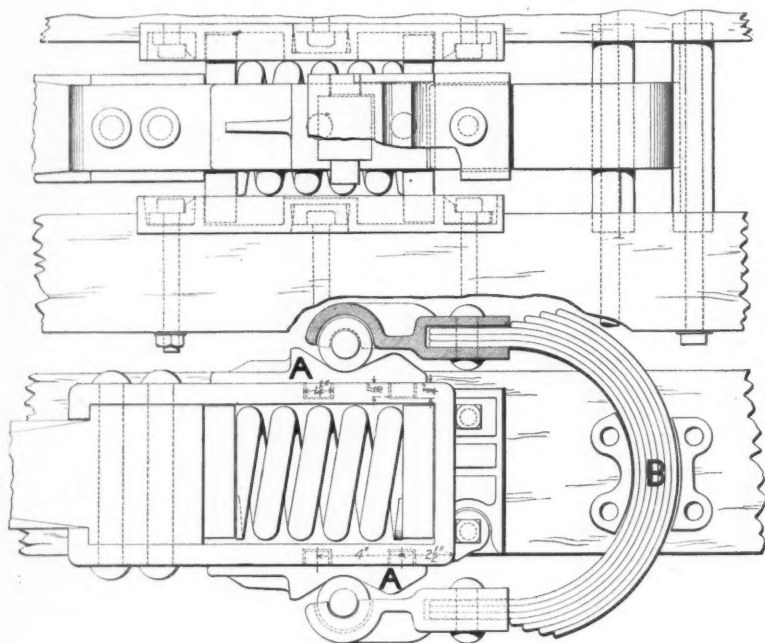


Fig. 1.

Hinson's Auxiliary Spring Device for Draft Gear.

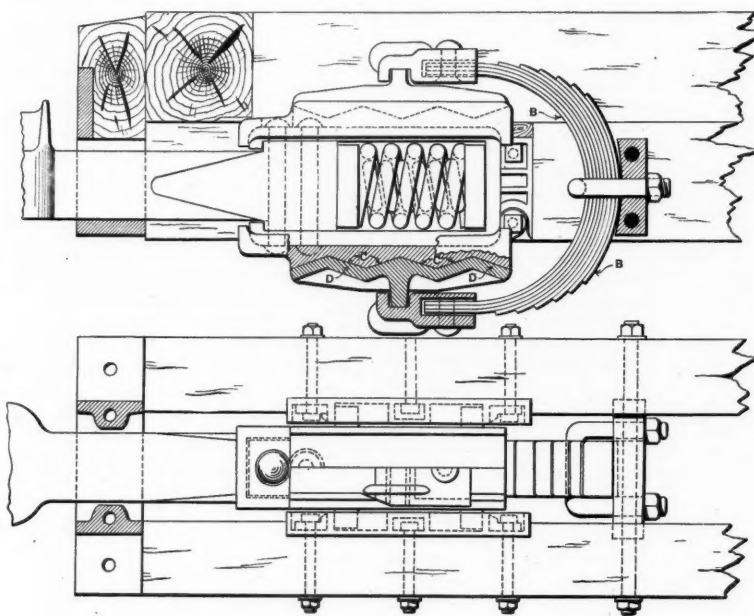


Fig. 2.

system. This would be the first answer to be made by one desiring to criticize our opinion on the ground that it is formed a thousand miles away. But it is to be borne in mind that, taking things as they are, and not as they would be under ideal conditions, the superintendent of a railroad of even moderate bigness is in one respect situated just like the observer a thousand miles away; he must deal with conditions which he cannot completely control or predict. If the execution of his wishes is to be entrusted to 1,000 to 10,000 men, he is compelled to calculate on a percentage of inefficiency, and therefore must adopt safeguards which might theoretically be shown to be unnecessary.

In considering the availability of the block system for the prevention of collisions like that at Norton, the circumstances of the case call to mind an excellent rule in force on the Chesapeake & Ohio, and, we believe, on other roads; the rule that where the space interval is in operation no train shall be allowed to go to a non-telegraph station, to meet another train, without a 31 order. In view of the satisfactory way in which this question of non-telegraph stations, and other difficult questions, have been met by various superintendents, and of the satisfaction with the block system which has been so universally expressed by those using it, we think we are justified in saying not only that it is the one scientific provision against collisions, but also that it is the provision most clearly required by business reasons.

The next most fatal accident, after Norton, was that at Springfield, Pa., which, however, is more of a bridge

is resisted by the elliptic spring B. The yielding resistance provided by the auxiliary device can be varied through a wide range according to the capacity of the elliptic spring used. This spring is secured behind the cheek plates and between the draft sills regardless of the kind of rigging used. The castings at the ends of the elliptic spring are loosely connected. In the arrangement shown in Fig. 1 the inclined surfaces are formed on castings having two lugs each which are let into the coupler yoke. The auxiliary device will not materially affect the movement of the coupler yoke through the first half-inch, but for the remaining travel of 1½ in. the resistance will be increased rapidly but steadily. The use of the elliptic spring effectually disposes of spring recoil.

In Fig. 2 the increased capacity is got through a combination of friction and spring resistance. In this case castings with sloping friction surfaces, C C, are lipped over the ends of the yoke insuring that these castings move with the yoke. Friction surfaces C C engage corresponding surfaces D D on castings which are acted on by the elliptic spring B. It will be seen from Fig. 2 that either a forward or backward movement of the coupler yoke causes the sloping surfaces of castings C to move along the corresponding surfaces of castings D, resulting in friction. Forward or backward movements of the yoke cause vertical movements of castings D, which are resisted by the elliptic spring B. It will be seen that the device shown in Fig. 2 differs from that in Fig. 1 chiefly in the substitution of friction surfaces for the rollers.

#### NEW PUBLICATIONS.

*Smokeless Powder, Nitro-Cellulose, and Theory of the Cellulose Molecule.* By John B. Bernadon, Lieutenant, United States Navy. 12mo. viii + 200 pages. Illustrated. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1901. \$2.50.

The author has put together a series of papers by various investigators concerning the composition of cellulose and the explosives prepared from it. To these he has added the results of his own experience and then he has drawn certain conclusions as to the ultimate chemical composition of cellulose and nitro-celluloses. Naturally the chief interest in the volume will be for military men and students of gunnery, but probably there will be a few specialists among our readers who will be glad to know of the publication of this thorough inquiry into this difficult and highly special subject.

*Engineering Studies Part III., English Stone Arches.* By Charles Evan Fowler. Pamphlet, 16 pages. New York: The Engineering Publishing Co. 1901. 25 cents. This pamphlet has engravings from photographs of eight masonry arch bridges in England and Scotland with short descriptions of them. It is a document quite worth adding to the collection of the engineer or architect.

*Mill Building Construction.* By G. H. Tyrrell, C. E. Octavo, 40 pages; illustrations. New York: The Engineering News Publishing Co. 1901. \$1.00.

In this little volume of three chapters Mr. Tyrrell deals first with the loads to be carried by the roofs, floors and walls of mill buildings. He then deals with the general design and finally, in the longest chapter of the three, with structural details. The volume will be found convenient by designers.

*The Construction of a Gasoline Motor Vehicle.* By C. C. Bramwell. Octavo, 150 pages; illustrations. New York: Emil Grossman & Bros.

Mr. Bramwell has written an excellent elementary treatise on the theory and design of the gasoline motor as applied to propelling vehicles. The explanation is simple and sufficiently complete and the examples of design are instructive. For those who are taking up this interesting subject now for the first time we can recommend this

book, and those who are already somewhat familiar with the matter will find interest and information in it.

#### TRADE CATALOGUES.

*The Eclipse Co.,* New York, has issued a folder calling attention to the economy of pneumatic tools. This company makes a full line of pneumatic machinery and is prepared to furnish detail information as to latest practices. There are branch offices in Pittsburgh, Boston & Chicago. The latter is in charge of Mr. E. B. Pickhardt.

*The Kinnear Mfg. Co.,* Columbus, Ohio, has issued a new catalogue of 52 pages showing the construction of its steel rolling doors and shutters, with views of recent installations. The latter give an idea of the variety of uses to which these doors have been put, and include doors applied to car houses of electric railroads, locomotive shops, a number of freight houses, roundhouses, piers and warehouses. Other views show buildings equipped with automatic fire shutters. In these the shutters are always open except in case of fire, when they close automatically under a temperature of 150 degs. The catalogue also contains instructions for erecting Kinnear doors and shutters, results of fire tests, and drawings of doors and shutters for different purposes.

*Machine Tools.*—The Hilles & Jones Co., Wilmington, Del., has just issued a fine Catalogue R, showing in



half-tone illustrations 20 new machines, modifications of standard designs, and special attachments for punches and shears which have not previously been shown in their catalogue. There are 35 pages in all, and from page 25 onward representative standard machine tools are shown by illustrations taken from the main catalogue. Among the 20 new things shown are vertical and horizontal punches with many convenient combinations; coping and notching attachments for I-beams, channels, angles and ordinary bar and plate work; a punch and coping machine for bridge and structural work; shearing machines and bending and straightening rolls. Improved plate planing machines are also shown in attractive combinations of power and convenience of access. The half tone illustrations are exceptionally good.

**Boiler Bracing and Braces**, Technical Library No. 5; **Little Giant Pneumatic Tools**, Technical Library No. 6—Joseph T. Ryerson & Son, Chicago, have just issued a couple of pamphlets with titles as above. The first contains an article by Mr. W. H. Wakeman, reprinted from the *Boilermaker and Sheet Metal Worker*, on proper bracing of horizontal tubular boilers, the McGregor crowfoot brace being especially considered in this capacity. In the latter part of the book are diagrams of boiler sections, showing spacing of tubes, position, number and sizes of braces commonly used, and other data of value. In line with the general tendency toward larger tubes, these are made largely on the basis of 3½-in. and 4-in. tubes.

The Library No. 6 pamphlet is illustrated with half-tones and line drawings, showing various "Little Giant" pneumatic tools, and much information in detail is given. Page 47 has a table giving comparison of cost between machine and hand riveting at the Chicago shipyards for three weeks ending Oct. 12, 1899. Page 48 contains a table of data from tests of the "Little Giant" tools in April, 1900.

### The Present Position of American Railroads.\*

BY THOS. F. WOODLOCK.

In response to the request of *The Economist*, I submit the facts and conclusions that follow, with regard to the present position of our great railroad companies. . . . With the cessation of "pooling" the railroads were left, apparently, without adequate means of protection against the evils following from an over-production of transportation, and in the ensuing decade all manner of expedients were tried to fill the office vacated by the "pool." These mostly took the form of "Associations" for regulating rates and for division of business upon agreed terms, but all suffered from a fatal defect, viz., the impossibility of legally exacting a penalty for infraction of these agreements. Finally, some three years ago, the Supreme Court of the United States decided in the case of the "Trans-Missouri" Association that all such forms of combinations were against the law. This decision was a death-blow to this species of hybrid "pool," and it was made clear to railroad men that nothing could be gained by attempting to work upon those lines . . . or can be enforced by law, and, with all such agreements outlawed at their very beginning, it was universally felt that the problem of rate maintenance and protection of territory had to be approached from another direction.

The late Mr. Huntington, I believe, originated the now famous phrase, "community of ownership," and in his characteristically direct way said that the only way to make rates stable was for the owners to "get together" and see that their managers did as they were told, not merely upon rates, but also upon other questions involving such matters as territory, etc. The idea was simplicity itself in principle, and merely meant that as the law would not automatically protect the owners of railroad properties against the public and against each other, the owners should protect themselves by mutual agreement and combination. The law prevented pooling, purchase by one railroad of a parallel and competing road, and so on, but the law could not force one railroad to cut rates against the rest, nor could it prevent the same set of capitalists owning two parallel and competing roads. In a word, the law could prevent railroad companies from doing certain things as companies, but it could not prevent their owners from doing these things as individuals, and Mr. Huntington's plan was that the owners should act where the railroads could not. This idea was seen to possess remarkable possibilities. The great banking interests identified with the principal railroad systems soon began to put it in practice, and, thus far, with excellent results.

In order to describe these results in a comprehensible manner it is necessary to note the natural divisions into which fall the main railroad systems of the United States. . . . It will be seen that the country falls into four main divisions marked "A," "B," "C," and "D" on the map, and these divisions may be named for the purpose of these articles, as follows:

"A." Trunk line division | "C." Southwestern division.  
"B." Northwestern division | "D." Southern division

These divisions arise naturally from the general trend of traffic, and from the consequent grouping of railroads related according to traffic. It will be necessary to re-

member at all times that this grouping, while by no means arbitrary, is not to be considered exhaustive or too closely definitive. . . .

To the Pennsylvania Railroad under the presidency of Mr. Cassatt and to Mr. W. K. Vanderbilt is due the credit for the initiation of the policy that has now finally solidified the trunk line situation. In the fall of 1899, a complete understanding was reached by Pennsylvania and the Vanderbilt lines respecting the railroads known as "trunk lines," and also respecting the anthracite and bituminous coal interests lying more or less east of the Allegheny Mountains. The exact terms of this compact, of course, have never been divulged, but its general bearing is plain enough. It consisted practically in a division of territory and coal interests.

Pennsylvania assumed general responsibility for and partial control of those trunk lines lying south of its own tracks and serving trunk line territory; the Vanderbilts undertook to influence—with Mr. Morgan's assistance—the destinies of the trunk lines lying north of the Pennsylvania system. The coal interests were similarly divided, Pennsylvania naturally taking bituminous coal in charge, and the Vanderbilt-Morgan interests dealing with anthracite. As a result of this agreement some important purchases were made on both sides. Pennsylvania, acting jointly with the Vanderbilts, purchased a practical majority of Chesapeake & Ohio, and placed its own representatives in the Chesapeake & Ohio board of directors. It also purchased an almost dominant interest in Norfolk & Western, securing a large representation in the board of that company. The Vanderbilt lines purchased a majority of "Big Four" stock, and of Lake Erie & Western, while Mr. Morgan greatly strengthened his hold on the anthracite situation by purchase of the Pennsylvania Coal Company for the Erie,



Sketch to accompany Mr. Woodlock's Article.

and Jersey Central for the Reading. Later, Pennsylvania secured complete control of Baltimore & Ohio, this placing it in a position of great strength in both the trunk line and bituminous coal situation. Lehigh Valley, Erie, and Lackawanna being already dominated by Mr. Morgan and Vanderbilt interests, there were left independent only the Ontario & Western and the Wabash, the latter now being dominated by Mr. Gould. Neither of these roads has heretofore cut much figure in the trunk line situation, but Ontario & Western, as carrying 5 per cent. of the anthracite tonnage, is a good deal of a factor in the coal business.

The distribution of the roads in this division consequently is as follows:

- I.—PENNSYLVANIA GROUP.
  1. Pennsylvania system
  2. Baltimore & Ohio
  3. Chesapeake & Ohio
  4. Norfolk & Western
 And some minor properties.
- II.—VANDERBILT-MORGAN GROUP.
  1. The N. Y. Central system
  2. Erie
  3. Lehigh Valley
  4. Delaware, Lackawanna & Western
  5. Reading system
  6. "Big Four" (C. C. C. & St. L.)
  7. Lake Erie & Western
 And some minor properties.
- III.—INDEPENDENT ROADS.
  1. New York, Western
  2. Wabash Railroad (owned by the Goulds)
 And a few minor properties.

From the foregoing it is clear that the trunk line situation has been thoroughly "cleaned up" by the immensely powerful Pennsylvania-Vanderbilt-Morgan interests, and the results were apparent—and are still apparent—in the stability of rates in the last year. There is no "leak" anywhere in trunk line territory so far as rates are concerned. Coal prices, moreover, both as to anthracite and bituminous, are firmly held at figures materially above the lowest of recent years. . . .

The owners of Wabash—the Gould interests—are also owners of the Wheeling & Lake Erie, and are planning a line into Pittsburgh, much against the wishes of the Pennsylvania-Vanderbilt interests. . . .

Chicago and St. Louis are the western limits of trunk line territory, and it is important to note that there is a general acceptance of the principle that lines west of these points should not extend east, while the trunk lines should not go west. The reason is that the natural conditions of traffic cause a redistribution of freight at these points so as to make it more advisable for eastern roads to exchange business with several western roads, and vice versa, than to form hard-and-fast partnerships one with another. The Missouri River is a natural boundary of trunk line territory, and any railroad cross-

ing this would provoke a combination of other roads against it, as would any road crossing the Chicago boundary line. There has been much talk at various times of this, that, or the other "trunk line" taking definitely to itself one or other of its western connections, but up to the present time none of the large roads have been willing to take the irrevocable step and, as it were, cross the Rubicon. Attempts are, however, being made to develop a complete Transcontinental line from the west.

As regards maintenance of rates and prices of coal, the establishment of "community of ownership and interest" in the trunk line territory must be pronounced a success. Up to the present, however, it has been tested only in a season of great prosperity. . . .

The division which I have called the North-Western Division has recently been the scene of one of the most remarkable financial struggles ever known in our stock market. For a clear understanding of the "Northern Pacific corner" we must begin with an outline of the railroad situation in the Northwest in the year 1895.

In that year . . . a species of "community of interest" was established, Mr. Hill and his friends and associates buying over a quarter of a million shares of Northern Pacific common stock at \$16 per share from the syndicate in charge of the Northern Pacific reorganization, and undertaking to give the company the best advice and support that they could. . . .

The "Clearwater" dispute caused a severance of intimate relations between the two companies, and for 12 months they were in every way sharp rivals and competitors. . . . Immediately after election day, in 1900, it was made clear to everyone that Great Northern and Northern Pacific were again in the closest relations, and that Mr. Morgan and Mr. Hill were co-operating in the Northwest. About this time a further most important step in the unification of the interests of these two roads was taken, and this was mainly the result of the opening up of the great lumber regions of the far Northwest, following upon the practical exhaustion of the lumber regions of the Middle West. The effect of this development was to make it essentially desirable that railroads serving the lumber territory of the Northwest should have very close traffic connections with the regions of the middle West and South, consuming large quantities of lumber, and, therefore, Mr. Hill and Mr. Morgan set out to acquire the St. Paul road in the interests of Great Northern and Northern Pacific. They were hindered in this by certain large owners of St. Paul stocks, who refused to sell except at prices too high for the purchasers. Consequently, the attempt was abandoned. About the middle of February, 1901, however, Mr. Morgan proposed to Mr. Hill that the Burlington road should be bought in the interest of the two Northwestern roads. The price of Burlington stock at that time was about 140. In six weeks or so from that time, Burlington stock had risen above 190, and control had been secured. Great Northern and Northern Pacific jointly guaranteed bonds for double the face value of Burlington stock, and practically all the Burlington stockholders agreed to accept these bonds for their stock. . . .

Union Pacific was alarmed, owing to the fact that the Burlington road was a close competitor in Union Pacific's own territory. The Union Pacific Company had but a short time previously to the "Burlington deal" put the keystone to its arch through the purchase of control of Southern Pacific. . . . Union Pacific had no interest in the Burlington purchase, and the managers had to protect their road in another way. This they did by the purchase of a majority of stock in the Northern Pacific. Out of the purchases with this object in view and the purchases by the opposing interest to protect their position, grew the Northern Pacific "corner." When the smoke had cleared away, it became abundantly clear to all parties concerned that a comprehensive agreement dealing with the interests of all the important railroads between the Mississippi River and the Pacific Coast was the only possible permanent solution of the extraordinary situation that had arisen. The railroads concerned were these:

Great Northern,  
Northern Pacific,  
Union Pacific (including Southern Pacific),  
St. Paul,  
Chicago & North-West,  
Burlington,

together amounting to some 45,000 miles of road, taking some \$300,000,000 annually in gross earnings.

Immediately upon the result of the contest for control of Northern Pacific becoming known to both of the contending parties, steps were taken to formulate an agreement protecting all the equities in the case, so far as this could be done. This agreement has now been made, and is simple and short, though of great importance. . . .

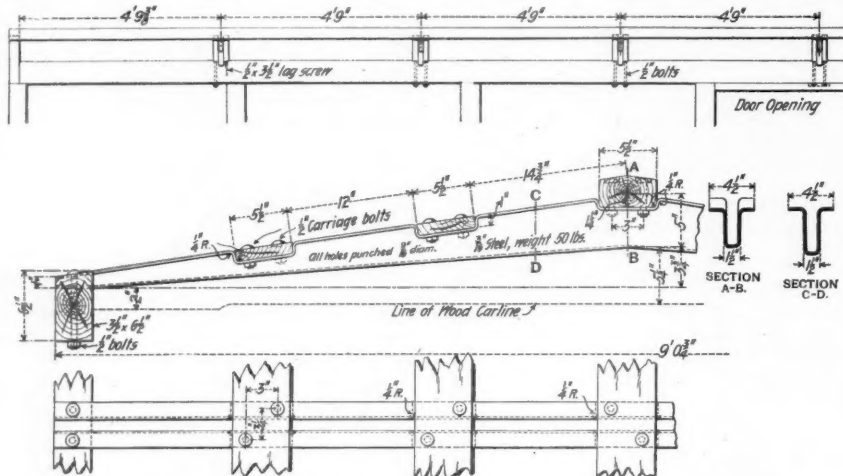
The effect is to bring all the Northwestern roads and, with one exception, viz., Atchison, all the Transcontinental roads into close relationship. . . . Order has been brought out of chaos in the case of these Northwestern roads, and their destinies now lie in the control of a few men who have determined to act in entire harmony, realizing that only in this way can the best results be secured for the railroads. Mr. J. P. Morgan, Messrs. Kuhn, Loeb & Co., Mr. Hill, and Mr. Harriman can now dictate a policy for the 45,000 miles of railroad mainly lying in the Northwestern division.

\*Extracts from recent articles written for *The Economist* (London).



## Pressed Steel Carline—Pere Marquette Railroad.

The accompanying engraving shows a pressed steel carline designed by Mr. B. Haskell, Superintendent of Motive Power of the Pere Marquette, which is being applied to 500 box cars now building for that road at Chicago, by the American Car & Foundry Co. These are 38-ft. wooden box cars, and for this length of car seven steel carlines are used instead of 11 or 12, which would be needed if the carlines were wood. By reference to the drawing it will be seen that the steel carlines are trough-shaped and pressed up out of  $\frac{3}{16}$ -in. steel and weigh 50 lbs. each. The saving of weight over wooden construction is about 200 lbs. per car, and the capacity inside is increased about 50 cu. ft., the clear height at the sides being increased 2 in. and at the center  $5\frac{1}{4}$  in.



Pressed Steel Carline as Applied to 38-ft. Box Cars—Pere Marquette Railroad.

The lower line of a wood carline suitable for this class of cars is shown by dotted lines. The pressed steel carlines give the required stiffness and they make a very neat looking job. The details of the roof construction are clearly shown by the engravings.

## Uganda Railway.\*

The Uganda Railway is instructive—

First. In showing the inferences that may be deduced from the study of maps and books of travel.

Second. As an example of an excellent reconnaissance based on astronomical and barometrical observations.

Third. As an instance of the combination of difficulties different from those ordinarily encountered by the engineer.

In 1891 I had to advise the Imperial British East Africa Company on the question of railroad communication with Lake Victoria. I had never been in the country, which before 1888 was practically a *terra incognita*, the only European who had succeeded in penetrating the country being Mr. Joseph Thomson in his rapid and necessarily superficial expedition through Masailand. What was known of the rest of the region was the result of conjecture, or native reports, gathered by missionaries. Stanley visited Lake Victoria via Congo, and Fischer had in 1883 passed through German territory to the Dogilani Plain and Navasha. In 1888, Jackson and Geddes expedition passed via Machakos to Navasha, and thence via Stotik to Lake Victoria. From these sources Ravenstein's map was compiled; and from it, and from the records of Thomson's and Jackson's expeditions published by the Royal Geographical Society, I had to glean the information on which my advice was based. A map thus compiled must necessarily be sketchy and in points inaccurate; but, notwithstanding these defects, it afforded valuable information. Some idea of its inaccuracy may be inferred by the results of recent surveys near the mouth of the Nyando. Little information was given about the escarpments which bounded the great rift that traversed the country. There were no records of any European having visited either the Mau Plateau or the Valley of the Nyando.

After careful study of the sources of information, I submitted to the I. B. E. A. Company a sketch map, on which I had marked the line of reconnaissance which I recommended for first trial, giving also the reasons for my advice, which may be summarized as follows:

1. A typical section in a straight line from coast to lake was assumed.
2. A great volcanic rift existed, at least 20 miles in breadth, with escarpments 1,500 to 2,000 feet high.
3. A chain of lakes indicated that the rift extends throughout British territory, and therefore cannot be avoided.
4. A longitudinal section of the rift and its escarpments was assumed.
5. Close to the coast the Rabai Hills, 700 feet high, had to be rounded.
6. Voi was an obligatory point for purposes of water supply.
7. From Rabai Hills the land rises steadily to 5,000 feet at the rift.
8. The Tsavo River should be crossed between its confluence with the Sabaki and the River Mlololo.

\*Abstract of a paper by Sir Gifford Molesworth, K. C. I. E., read at the Glasgow Engineering Congress.

9. Mackakos must be avoided either by the Athi Valley or an alternative route.

10. The ramifications of the Athi River indicated the probability of a low point in the escarpment, and the best approach to the rift near Ngongo.

11. The descent of the eastern escarpment should run in the direction of the rising rift floor.

12. The line should pass along by Lakes Navasha and Elmenteta to the culminating point at Nakuro.

13. An easy line would be obtained in the rift floor at this part.

14. The best point for ascending Mau escarpment was at Lake Nakuro.

15. The ascent should run in the direction of the fall of the escarpment.

16. A railway by Jackson's route through Sotik was impracticable.

17. The only probability of a favorable line descending to Lake Victoria was by Mau Plateau and the Nyando Valley.

18. A line via Nzoia River would involve a considerable detour and broken ground.

19. Beyond Ngongo, excepting the portion in the rift floor, the line must be difficult and costly.

Macdonald's expedition in 1891-92 entirely confirmed these inferences, with one exception, the main point of difference being that the route via Nzoia was followed instead of the Nyando, which was considered impracticable. This change involved a detour of about 100 miles, but when the permanent survey was made in 1898 it was discovered that the Nyando Valley was quite practicable, and the railway is now being made through it.

Macdonald's reconnaissance was very ably made by compass, pedometer, and aneroid barometer. The cross sectional slopes of the country taken by Abney's level. Corrections were made for the diurnal barometric wave, which is very important in the tropics. Plans and sections were plotted in camp each day, and linked in by triangulation where feasible; otherwise by astronomical observation. The position each day was checked either by latitude and longitude with chronometer, or by longitude from occultations. Notes were taken of the dimensions, slopes, floodmarks, soil in bed and banks, all waterways, and of the general physical and geological features of the country.

The difficulties encountered in the construction were very great. A port had to be established, with jetties, moorings, cranes, steam launch and lighters, and connected with the terminus by a short railway with a gradient of 1 in 50. Store sheds and work shops had to be built, laborers housed, nearly all the labor had to be imported from India, many subordinates obtained in India or locally were incapable or inebricated, those sent from England were satisfactory. The staff was new to the work, the language, and each other. No supplies were available in the country; even poles and thatch for coolie sheds had to be imported. Native raids necessitated military escort for the first survey parties. The construction involved an organization equivalent to the maintenance of an army of 15,000 men in a practically waterless country devoid of resources, and of all means of animal or wheel transport, with a base of operations to which everything had to be imported from a distant country. Large condensing plant was needed to supplement the water supply, and a corn mill to grind the imported food. The line had to be constructed telescopically, and it was impossible to maintain working parties far in advance of railhead. Separate water trains had to be run, and locomotives had to take a heavy water tank to supplement the tender. Heavy temporary works were necessary to expedite the progress of railhead; 34½ miles of temporary diversions were needed for the first 300 miles; amongst these were the Macupa Bridge and the Mazeras Viaduct, built in 91 and 25 working days respectively. The ruling gradient on these diversions was 1 in 30, with curves 400 ft. radius; these limited the power of the engines. On one temporary diversion the descent to the rift was made by four rope inclines with a maximum gradient of 1 in 2, making a total descent of 15,000 ft. with a length of 6,000. The engineering strike in England delayed the supply of locomotives, rolling stock, and bridges. The first 250 miles were infested with tsetse fly, fatal to transport animals; nearly all of those imported died. Jiggers abounded, causing ulcers, which often necessitated amputation of one or more toes. Man-eating lions killed 28 of the Indian laborers, and caused a panic. Waves of fever

passed over the country, and at one station I found 90 per cent. of a working party down with it. It was necessary to organize an agency in India for labor and materials, a postal service with regular mails, a force of 200 police, complete hospital staff, a temporary telegraph beyond railhead; and a small steamer had to be carried piecemeal by porters to the lake. The viaducts over the deep ravines in the descent into the rift had to be constructed telescopically. The responsibility for the whole of this organization rested on the chief engineer, and very great credit is due to him and his staff for the able manner in which these difficulties have been met.

## The Tunnel Between Scotland and Ireland.\*

[Possibly we ought to explain that this short article is not published because we suppose that the tunnel will be built. It is merely an entertaining engineering study. —EDITOR.]

The first question considered is the selection of a site for the tunnel. Three positions suggest themselves. First, the nearest approach of Great Britain to Ireland is at the Mull of Cantyre, where the distance to the Co. Antrim is 12½ miles. The next position in point of distance is from Wigtonshire, where the Scotch coast comes within 21 to 25 miles of Ireland. The third position is from Holyhead to Howth. The maximum depth of water on the Cantyre route is 460 ft.; on the Wigtonshire route the depth varies according to the line selected, and is from 480 to 900 ft.; and the greatest depth on the Holyhead route is 432 ft. The first of these positions has to be abandoned on account of its not forming a practically useful connection. The second forms a direct line between Carlisle and Belfast, the business center of Ireland, and gives the best route from Scotland to all Ireland, and for the North of England to Ireland. The third route would connect London best with Dublin, but would be of little use as between Scotland and Ireland, and being more than double the length of the second route, it has to be abandoned, and the second route adopted for the present project.

The tunnel line adopted begins at the Stranraer Railway Station, enters the tunnel at five miles, and reaches the shore line at Island Magee, Co. Antrim, at 34 miles, rising 1 in 75 from the deep water, and passing out of the tunnel at 39½ miles, runs 10½ miles into the terminus at Belfast. Total length, Stranraer to Belfast, 51½ miles, of which 34½ is tunnel, and 25 of this under the sea. To provide suitable drainage the line falls each way from the center, and drainage headings have to be run to the shafts at each side, where pumping stations would be placed. The top of the tunnel is proposed to be placed 150 ft. below sea bottom, and the tunnel is to be for a double line.

The principal operation, and that which controls the time of execution of the whole work, is the heading. The heading proposed is 10 ft. wide x 7 ft. high. The heading through the Silurian, we think, should be as rapid as those now being made in the Simplon Tunnel; those in the Keuper marls more rapid; and the whole heading can, we believe, be completed under 10 years, and the finished tunnel between 11 and 12.

Improvements in rock drilling in the Alpine Tunnels have been remarkable of late years; the maximum speeds of Alpine tunnels are as follows:

	Cost per yard complete.
Mont Cenis, maximum speed per day, 6 yds.....	£224
St. Gothard, maximum speed per day, 10 yds.....	142
Arlberg, maximum speed per day, 12 yds.....	107

The Simplon heading has so far been faster than the Arlberg, and in a very hard rock (specimen of the rock submitted with this paper); specimens of the rock we have to do with also submitted, showing the silurian, sandstone and Keuper marl.

The amount of water to be dealt with is the one uncertainty, though we have grounds for believing it is not likely to be a very serious difficulty. The Severn and Mersey tunnels encountered no serious water leakage under the sea, the great leak of the Severn Tunnel being from fresh water and a quarter of a mile from the sea. Judging from these tunnels, and a tunnel driven under the Forth by Sir Benjamin Baker, there seems good ground for believing that the sea bed under the Irish Channel has probably sealed all interstices, so that excavation may be expected to be fairly dry. Silurian rocks are found in beds nearly vertical, which have been under heavy horizontal pressure, and will probably give little water either in the under sea or approach tunnels; the Keuper marls under the Irish side are remarkably suited to an under water tunnel, being perfectly watertight where examined down to 900 ft. The new red sandstone which lies between the marl and silurian allows water to percolate, but is not likely to give large quantity; 150 ft. of cover between tunnel and sea bed will, it is expected, make all safe.

The working of the line from Stranraer to Belfast is proposed to be by electric motors from installations near the main shafts, one at each side of the channel; and it is intended that trains be run at a speed of 60 to 70 miles per hour, so that the time of tunnel would be a little over half an hour, and the whole distance traversed (Stranraer to Belfast) under an hour.

The cost of the tunnel is estimated by the engineers and by a contractor at 10 millions [pounds sterling], exclusive of interest during construction, and this leaves

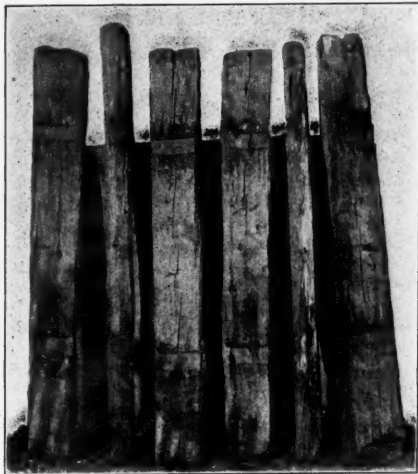
\*Abstract of paper by James Barton, Mem. Council Inst. C. E., read before the International Engineering Congress (Glasgow).



a considerable margin for contingencies. The finance of the project is the present difficulty, the prospect as a speculation not being sufficiently good.

#### The Life of Cedar Ties.

The photograph reproduced herewith shows six cedar ties that have been in actual use on the Prince Edward Island Railway for 28 years. There are a great many more of the same kind still in the track that have been



Cedar Ties After 30 Years in Tracks.

there for 28 years or more. This is the usual cedar of New Brunswick. Mr. Harry Houle is trackmaster and was in charge of the track when these ties were put in, as he is now, when they are taken out. We are indebted to Mr. Russell, Manager of the Intercolonial, for the photograph.

#### Trade in South Africa.

While the resumption of mining operations may portend much, I believe that there will be no immediate demand for mining machinery and appliances, for the reason that large orders have been placed (many in the United States), and at the coast ports much machinery, etc., can be found waiting for a clear track to the Transvaal. The shortage of cars may be accounted for, not only by the destruction of the war, but also from the fact that the construction of new ones is delayed by lack of men. Recently, 10 Baldwin and 10 Schenectady engines have arrived, and have completed the 1,000-mile run required by the specification. If the permission of the Portuguese Government can be obtained, a line of railroad will be built from Delagoa Bay to Johannesburg. The line will be standard gage, 4 ft. 8½ in. Delagoa Bay will in a short time be a port of great value to the Transvaal, and Johannesburg will probably reach a population of 500,000. Mr. C. B. Elliott, late General Manager of the railroads of Cape Colony, is now on his way to the Continent and the United States. In a recent interview, he stated in substance that "a preference would be given to English manufacturers, with a certain margin." But he added that the Cape Government was cosmopolitan, and if the Americans offered an article as good as that offered by England, at a price below the margin referred to, the order would be given to them. Some time ago, an order for 167 "steel self-dumping coal cars" was sent to an American manufacturer. These have arrived and are being erected at Cape Town and Port Elizabeth. The railroad men, including the General Manager, have expressed themselves as being pleased with them. Figures to the contrary, 1900 has been the largest export year of the United States to South Africa. The statistics of 1900 can not be depended upon, as there is an entire absence of returns from Delagoa Bay.

The recent prices of American merchant iron and soft Bessemer steel made an opening for a large trade in those commodities in South Africa. One of the largest merchants here received samples of 25 tons, which were taken to the railroad shops for bolts, etc., and to the coach builders. Either the blacksmiths did not know how to work American iron, or the steel was not up to quality stated, for in working, it was found to be brittle; it "would not weld or head well." The failure of this shipment has struck such a blow to the iron trade that, until samples arrive that will do the work required, no headway in this line can be made.

It is gratifying to note the remarks of Lord Roberts regarding American wagons. He said: "Six buck wagons were imported for trial from the United States. These proved to be superior to any other pattern of either Cape or English manufacture." A shipment of these wagons is now on the water and large orders may be expected. Wagons for this market must use the "Peavey brake," which is operated from the rear by a screw.

The lumber trade for the year is highly gratifying, and the United States has had the bulk. Twelve American sailing vessels are now awaiting discharge. The lumber is principally Oregon pine. For the year ended June 30, 1901, over 50 Swedish and Norwegian sailing ships have left South Africa for our Southern ports, to bring back pitch pine.—*Consular Correspondence.*

#### TECHNICAL.

##### Iron and Steel.

Graham Macfarlane, M. Savage, R. B. Hickman, H. L. Williams, and H. N. Leech, of Louisville, Ky., are interested in a company formed to take over the Red River Iron Co., including the Helen Furnace and limestone properties and ore lands in Montgomery County, Tenn.

The reorganization of some of the constituent companies of the United States Steel Corporation, which was begun soon after President Charles M. Schwab took hold of the greater company, is, according to a report in the *Pittsburg Post*, to be carried on again as soon as matters have quieted down from the strike. It is said that one of the first moves to be made will be the consolidation of the American Sheet Steel Co. and the American Tin Plate Co.

##### Washington Pumping Station.

On Sept. 21 bids were opened at the District Building in Washington for the proposed pumping station for the water department, to be located near Howard University reservoir. The bidders were: Cramp & Co., of Philadelphia; E. M. Noel, of Baltimore; the Pennsylvania Bridge Co., of Beaver Falls, Pa.; George A. Fuller Co., Chicago; B. J. Carlin, Brooklyn; and Arthur Cowsill, Richardson & Burgess, I. Malone & Son, and William E. Spier, all of Washington. The bids ranged from \$298,000 to \$411,000, the lowest being from Noel & Co. Separate bids were opened for the steam generating plant of the same station, those bidding being Crook, Horner & Co., Baltimore, \$51,803; Westinghouse-Church-Kerr Co., of New York, \$51,184, and the Babcock & Wilcox Co., Philadelphia, \$55,193.

##### The Lackawanna Steel Plant at Buffalo.

Less than two years ago the work on the \$25,000,000 steel plant of the Lackawanna Iron & Steel Co., at Stony Point, on the shore of Lake Erie, adjoining Buffalo, was begun. The buildings already erected cover several acres. The company has acquired a strip of land with about three miles of frontage on the lake and it is stated that the buildings of the plant, when completed, will stretch over a shore line of one and one-half miles. One contractor has work which it is expected will require three more years to complete. The buildings already finished or almost finished are the following: A four-story brick and stone office building, 100 x 125 ft.; a machine shop, 300 x 80 and 50 ft. high; a boiler shop, 300 x 80 and 30 ft. high; a foundry, 500 x 80 and 50 ft. high; a pattern shop, 50 x 100 ft., two stories high, is finished; a storehouse for patterns, 50 x 100 ft., four stories high; a power house, 30 x 50 ft., one story high; a carpenter shop, 50 x 100 ft., two stories high; a supply shop, 50 x 100 ft., one story high. The foundations for several other buildings have been laid. Nearly 10,000 operatives will be employed when the plant is finished. Hingston & Wood, of Buffalo, who have a \$700,000 dredging contract, last week began a canal 200 ft. wide and about a mile long. Work on the tunnel, which is to run across and under this canal, from the pumping station and the coking plant to the blast furnaces and carry the gaspipes, steampipes and electric wires, is progressing rapidly. Gases from the retort coke ovens will be conveyed through this tunnel for driving gas engines at the furnaces. The shaft at each end is 90 ft. deep and the length of the tunnel will be 400 ft.—*Iron Trade Review.*

##### Locomotive Lights and Their Operation.

A report by a committee on this subject was presented at the yearly convention of the Traveling Engineers' Association, held in Philadelphia, beginning Sept. 10. It was the sense of the report that locomotive lights are of greater importance than is generally appreciated by railroad men, even the men who are directly responsible for their use and care. It was noted that there has been very little change or improvement in locomotive lights since the first locomotive was built, except that the number of lights has been increased, although the cab appliances have been greatly multiplied. Of the headlight it was said that its efficiency and use is largely governed by the condition of the road; that some of the older lines now have a right of way so good that the possibility of accident is largely precluded as far as the headlight might avert it, and that reflectors on such roads have been reduced to 15 in. in diam. with the idea that a front light to show the approach of a train is sufficient. This assumption could apply only to roads having interlocking systems, well-illuminated fixed signals and similar accessories. The necessity of a good headlight has evolved the electric and acetylene lights, the electric light being in most use. No data showing the comparative cost of maintenance of oil and other headlights were at hand, but it is believed that the improved light is most economical because of its increased factor of safety. It was plain that the electric headlight is a strong favorite with the Traveling Engineers' Association.

There was mention of a test of a headlight reflector designed to adapt its light projection to the curvature of the track as far as possible; the device is described as operating by gravity. It was the opinion that this device would give the engineman some advantage in looking ahead on curves. The report, and also the discussion, included the style and arrangement of illuminated engine numbers; the position of these number-slides, and also of the headlight; and many other things which naturally suggest themselves in considering the lighting of a locomotive.

#### THE SCRAP HEAP.

##### Traffic Notes.

It is reported that the steamers of the Canada Atlantic Railway which are engaged in carrying grain to the western terminus of that road will hereafter go to Duluth instead of Milwaukee.

A press despatch from Cleveland, Sept. 23, says that the injunctions recently obtained against the ticket brokers of that city have been made permanent. These injunctions restrain the brokers from dealing in round-trip tickets issued for the G. A. R. and similar excursions.

The railroads centering in Memphis have lately been favoring that city with a marked reduction in the price for the transportation of coal, which has now got down to about one-third of the usual rate. On Tuesday last the Illinois Central met the eighth cut made by the Southern Railway and the St. Louis & San Francisco, in the effort to get a ten cents differential on rates from mines of North Alabama, compared with those charged by the Illinois Central and the Louisville & Nashville from mines of Kentucky and southern Illinois. This puts all roads on a uniform basis of 45 cents a ton, as against an original rate of \$1.25. The Frisco & Southern are expected to meet the reduction.

According to the New York newspapers the railroads leading from New York to the West have agreed upon a division of traffic, in a small way. It is said that traffic officers of the trunk lines, after a series of conferences held to consider the strengthening of the agreement of last fall, which was intended to maintain tariff rates to the West on freight coming from Europe, have decided on a new agreement on entirely different lines. The essential feature of the new agreement is the appointment of a general import agent, nominated by a committee composed of all the New York trunk lines. The committee and its agent will have practically as great authority over the naming of rates and routing of traffic as in the case of the New York Grain Committee of the Trunk Lines.

##### The Cullm Banks.

Speaking of the possibilities of using the culm banks of the coal regions for powdered fuel or by means of gas producer plants and electrical transmission to surrounding territory, the *American Electrician* says, in part: "Of the two methods, the gas-engine plan appears rather more attractive, particularly in cases where the mines are not far distant from towns of considerable size. Then, the producer plant could be located at the culm pile and alternators driven by gas engines could be operated on the spot and the energy transmitted electrically to neighboring towns and cities for distribution. On the other hand, the use of the culm in pulverized form under boilers is less restricted geographically. It is highly improbable, however, that the redemption of anthracite culm will be effected profitably until the coal supply becomes so depleted as to force prices far beyond any figures at which coal has ever been sold in this country."

##### 24-Hour Time in Spain.

On Jan. 1, 1901, the railroads of Spain adopted the time of the Greenwich meridian and also the continuous notation from midnight to midnight. The royal decree ordering this prescribes that from midnight to midday the letters "a.m." shall be added to the numerals indicating the hours; from midday to midnight the letters "p.m." shall be added. According to the same decree, midnight appears on the dial as 24, and it shall be shown in time-tables and other such documents as 0 or 24, according as reference is being made to a matter which begins or ends at midnight. At the time when this decree was issued the newspapers and public men of Spain hoped that France and Portugal would take the same steps.

##### Grain Steamers on the Sacramento.

The Farmers' Transportation Co. has built a stern-wheel steamer for the San Francisco and Colusa grain trade, to carry 7,000 sacks on a 3 ft. 10 in. draft, which will enable it to run in the upper Sacramento at any time of the year. This line plans to build other steamers and carry wheat for \$1 a ton.

##### Extension of the Porto Rico Railroad.

General Manager Charpentier, of the Porto Rico Ry. Co., is reported to be securing sanction from the U. S. government to extend the existing road between San Juan and Alverado, 60 miles, narrow gage. It is proposed to build 160 miles of standard gage road in the island, encircling it.

##### American Electrical Equipment for Tokio.

It is said that American trucks and motors are to be ordered at once for the Tokio Deusha Tetsudo Co., which is to be a double-track electric line in the city of Tokio, 12 miles long. The car bodies are to be built in Japan.

##### A Variable Speed Gasoline Automobile.

The Washington Auto-Vehicle Company has been incorporated in Delaware to build motor-vehicles, and its plant will be established at Washington, D. C. A temporary shop has been secured at 511 Ninth street, where automobiles, bicycles and tricycles and certain automobile parts are now being made. It is understood that a permanent location will soon be secured and the building of larger vehicles undertaken. Under the Chamberlain patent on variable speed gearing the company will build gasoline vehicles for business use. The officers of the company are: J. S. Poole, President; J. B. Chamberlain, Vice-President; T. Janney Brown, Secretary and Treasurer.

##### Ambulance Chasers.

Accidents about the streets in the last few weeks have brought into greater prominence than ever the enormous amount of business done by lawyers who make a practice of negligence cases and send out so-called "ambulance chasers" to urge injured people to intrust their complaints to them. The mother of a young man injured in the accident at Kensington Junction (Brooklyn, N. Y.) Aug. 17, has been called on by 122 persons, each urging her to put her claim in his hands. In the case of a man who was killed in the same accident, the representative of the Brooklyn Rapid Transit Company had hard work to shoulder his way through the crowd of "ambulance chasers" who were besieging the house of the father of the dead man, even before the funeral. The husband of a woman injured in the same accident had to station a man in his front yard to keep the attorneys' "runners" from continually ringing the doorbell.

On May 11 a street car struck a wagon filled with young people having a straw ride. The wagon was upset, two of the party were killed and several injured. The State Railroad Commissioners put all the blame on the driver of the wagon, but the town of College Point was so



overrun with lawyers and "runners" from Manhattan, Brooklyn, Flushing, Jamaica and Long Island City that their carriages were standing five deep in the side streets leading to the main street of the town.

Two young women injured in an accident, Aug. 15, received a letter from a lawyer saying:

"I desire to inform you that I have three witnesses who saw the accident wherein you were injured. I should be pleased to take your case on the usual basis and pay all the expenses of litigation, and without any expenses to you whatsoever," etc.

In Brooklyn the number of lawyers doing strictly legitimate business is small; the great mass of attorneys are engaged in "ambulance chasing." Four-fifths of the cases tried before juries in the Kings County Supreme Court are cases based upon alleged negligence.

Most of these "ambulance chasers" are regularly employed on salary, or salary and some commission. The more disreputable of them are not attached to any office, but peddle their cases around. They may even take \$25 from an attorney, and then bring the plaintiff and the defendant together to settle the case and get that fee also for the trouble. There are attorneys in this business who have arrangements with saloonkeepers, proprietors of newstands and drug clerks to pay from \$5 to \$25 for cases brought to them. Where the plaintiff is poor his attorney sometimes gives him a salary for weeks to hold him along until the case is settled. Cases are regularly bought and sold like a commodity. The sale is made by paying the amount agreed on under the guise of counsel fees. Suborning witnesses is a regular business with these people.—*New York Tribune.*

#### A Large Pier for the Pennsylvania.

The Pennsylvania has let a contract for one of the largest piers ever built by the company. It is for the Northern Central, and will be located at Canton, Baltimore, on the Patapsco River. The pier, which will be known as No. 6, will be 120 ft. wide and 934 ft. 6 in. long, and will carry a shed, which will be erected at some future time. It will have two railroad tracks extending its entire length. A concrete bulkhead is included in the contract. The docks on both sides of this big pier will be 100 ft. wide, and will be dredged to a depth of 30 ft. at low water. The contract for the dredging is also let. The new pier will have a floor space of 112,000 ft.

#### The Snoqualmie Falls Power Plant Improvements.

On page 848, Dec. 21, 1900, we gave an account of continuous transmission of electric power 153, from the generating station of the Snoqualmie Falls Power Co., at Seattle. We now give from a recent issue of the *Western Electrician* some further information about the plant and improvements that will be made: "Two years ago the first current from Snoqualmie Falls was carried into Seattle and Tacoma, and in this short time the installation has proved too small. The capacity of the plant is to be enlarged to meet the increasing demand for power. At the falls, 44 miles in an air line from Tacoma and 32 miles from Seattle, are four generating units, each consisting of a water-wheel direct-connected to a 2,000 h.p. Westinghouse three-phase alternator. This system now generating and distributing 8,000 electrical h.p. is to be more than doubled. At 30,000 volts, it is proposed to carry 12,000 h.p. more into the cities, making a total output of 20,000 electrical h.p. The electrical machinery is to be furnished by the Westinghouse Electric & Manufacturing Company. If an impact wheel is used there will be a single wheel on each end of each generator shaft and each wheel will be driven by a single jet of water 14 in. in diam., under a head of 270 ft. The two water-wheels and the generator between will be built on a single hollow shaft of nickel-steel. The present underground generating station, which is 200 ft. long, is to be lengthened 150 ft. up stream. A new penstock is to be built which will carry 50 per cent. more water than the old one. The new transmission line will parallel the old line, and will require 125 tons of aluminum wire, and the order for it has already been placed. It is expected that the first of the new generators will be delivering current within the next nine months. The generating machinery will consist of three 3,000-kw. (4,000 h.p.) rotating-field generators of the two-bearing type, generating a three-phase current at 1,100 volts and 7,200 alternations. The current, which is generated at 1,100 volts, is to be raised to a line potential of 30,000 volts."

#### Moscow to Vladivostok.

A limited express train has been fitted up to run east of Lake Baikal on the Siberian Railroad to Stretensk, where connection is made with steamboats down the Amoor. This will connect with the corresponding limited express from Moscow to Lake Baikal, which has been running nearly three years. The transfer over the lake is by steamboat. The journey from Moscow begins at 8:35 p.m. Wednesday, reaches Irkutsk on Thursday of the following week at 6:30 p.m., where the passenger apparently stays over night; as he reaches Lake Baikal, 40 miles, only the next morning, and nine hours of that day, Friday, is occupied in crossing the lake, where the new train is taken at 6 p.m., which reaches Stretensk at 10:37 the next Monday morning; 11 days and 14 hours from Moscow. The steamboat journey down the Amoor lasts about a week, but varies according to the stage of water (transfers are made from boats of light draft to larger ones); and then comes the run over the Ussuri Railroad to Vladivostok in 32 hours. First-class fare is \$88.50. It is hoped soon to run an express train twice a week. Navigation on the Amoor closes early.

#### Round-Trip Tickets in Prussia.

The most important change in passenger rates on the Prussian State Railroads since the formation of the system was made July 4 last by making all round trip tickets good for 45 days, instead of the very limited periods, from two days up, according to distance, as heretofore. Already the larger part of the travel was on round-trip or other reduced rate tickets; and we may believe that now all but a small fraction of the traveling will be on such tickets. They cost 25 per cent. less than two single tickets. Since the change was made, many of the connections of the Prussian railroads have adopted it for trips which are partly over Prussian lines.

#### The Recovery at Galveston.

In the annual report of the M., K. & T. we find the following: "The great disaster at Galveston on Sept. 8, 1900, resulted in serious loss to your company by direct damage to its property and by interruption and injury to its business. Notwithstanding the appalling loss of life and property the energy of the citizens of Galveston enabled them to retrieve the injuries suffered by the storm so rapidly that the aggregate of business from the port was well sustained as compared with previous years. "The conditions of general commercial activity throughout Texas have never been equalled, a notable stimulus having been given by the extraordinary crops of the past season, the high prices realized for their products, and

by the oil discoveries near Beaumont. The oil development has induced much travel in its direction and caused great local excitement, but the only bearing it has on your company's traffic is that if this oil shall be largely used for fuel, it will displace to some extent at least the use of coal in South Texas, and will probably disturb rates on coal to competitive points."

#### Sunday Excursions in Michigan.

The Sunday excursion business has become a prominent feature on the railroads of Michigan. It was first introduced only a few years ago, by the Detroit, Grand Rapids & Western and the Chicago & West Michigan, and for one or two seasons but few trains were run, but their number has been constantly increased until to-day trains are run by all of the important roads of the state, almost every Sunday and in all directions. Last winter a number of the principal lines tried to agree to abolish this class of business entirely, it being claimed that so much of the regular traffic took advantage of the trains and low rates, as to make it unprofitable. On the other hand, however, it appeared that the business done by the excursion trains was extra business entirely. The majority of the persons traveling on such trains are working people, who have neither the time to travel on week days, nor the money to pay regular rates; but they take advantage of these trains and rates to visit their relatives and friends. A large majority of the Sunday passengers make short journeys, indicating that a large number of them are visiting friends; and it is fair to assume that such visits would not be made except for the exceptional facilities and rates provided. Since the conference last winter, all efforts to abolish the business have apparently been abandoned, and the business is now at its height, all of the roads, including the older and more conservative ones, running trains every Sunday and making special efforts to secure the business. L. C. H.

#### Train Equipment in Argentina.

According to an order recently issued by the Minister of Public Works all railroad trains in Argentine Republic must henceforth carry in the baggage car, besides the ordinary tools and appliances, a lantern to show white, red or green; a case of first aid appliances, a telegraph instrument, a telephone and a railroad bicycle or hand car.

#### State Railroad Regulation in Texas.

The Railroad Commissioners of Texas have again been compelled to lay before the public a defense of their conduct, a bill having been introduced in the Legislature to reduce by several thousand dollars the appropriation for the support of the Commission. A circular has been issued, and copies of it sent to members of the Legislature, giving reasons why the proposed reduction should not be made. The force of experts and clerks employed by the Commission is now smaller than it ought to be; the rate experts receive \$2,700 and \$2,500 salary respectively, whereas railroad officers doing similar work receive \$4,000 to \$6,000, though the state officers have to do the work for 10,000 miles of line, accommodating 3,000,000 people. The Auditor of the Commission receives only \$2,700, but performs duties for which the Federal Government pays two men an aggregate of \$6,000. It is held that the Commission has done a good work; it has arrested rate cutting and thus prevented discriminations, with an appropriation of \$5,000 it discovered facts which brought to the state treasury \$72,500 in penalties. If for lack of money the Commission stops investigating the railroads may be expected to resume their evil practices. The proposed law requires the Commission to report in minute detail what its experts have done and state whether any employees of the Commission are related by affinity or consanguinity to any of the commissioners. To this it is replied that the annual report gives sufficient details of the work and that a son of Commissioner Reagan is Assistant Engineer on the Missouri, Kansas & Texas. The Commissioner, however, had nothing to do with getting this place for his son.

In spite of the annoyances of petty politicians Chairman Reagan's character and reputation seem to be secure. He has not only reputation but fame; for the Daughters of the Confederacy are going to erect to his honor, in Palestine, a monument. Judge Reagan is the last survivor of the Richmond cabinet of 1861-65. The monument will stand at the junction of two principal streets.

#### A Russian Battleship by Cramp.

The Russian battleship "Retvizan," recently completed by Wm. Cramp & Son, returned to Philadelphia Sept. 16, after a three-days' builders' trial off the Delaware Capes. The trial board of Russian naval officers gave an official test for stability and structural strength and the ship was found satisfactory. The speed trial was only preliminary and the speed made was 17.75 knots at 122 revolutions. The speed called for by the contract is 18 knots and it is expected that this speed will be attained at the official trial the middle of October, when the ship will have a 12-hour trial at sea. The "Retvizan" is 384 ft. long between perpendiculars, 72 ft. 2½ in. beam, and has a displacement of 12,775 tons. Practically no wood was used for this ship, even the bulkheads being of asbestos, which is also used for sheathing the entire interior, and her boats are of metal.

#### Sydney to London, 32 Days.

The time of the fast mail trip from Sydney, N. S. W., to London, recently referred to in these columns, was 32 days. The departure from Sydney was on August 13 at 10 a. m., and the mail—127 sacks—was delivered at the London post office on Sept. 14 at 7 a. m. It is said that this time is seven days quicker than the average time by the regular mail route from Sydney to London, which is through the Suez Canal. The only part of the route over which a special train was used in carrying this mail was from Council Bluffs, Ia., to Toledo, O. From Council Bluffs to Chicago the time was about 10 hours. The train ran on the schedule of the regular fast mail, but it consisted of only one car, the rest of the mail for that trip being taken by a second section. From Chicago to Toledo a special train was run to overtake the regular train, which had left Chicago about an hour-and-a-half before the Australian mail was ready. The overland route was by the Southern Pacific, the Union Pacific, the Chicago, Burlington & Quincy, the Lake Shore & Michigan Southern and the New York Central. It is understood that the special service performed by the railroads was paid for by the Oceanic Steamship Company, which is looking for a permanent mail contract from the British Government.

#### Many Passengers Burned to Death in Roumania.

Press despatches of Sept. 21 report a collision at Palota, Roumania, near Turnseverin, resulting in a wreck which took fire from burning oil and was destroyed, together with the bodies of many passengers killed or injured in the wreck. A freight train, which became uncontrollable on a descending grade, ran into the rear of the Vienna express. Eighteen carloads of petroleum were

wrecked, and these, with six passenger cars, were mostly destroyed. Immediately after the collision the ground around the trains was a burning lake of oil, and trees and everything inflammable within 50 rods were destroyed. The accounts of the number of victims differ, but the number of dead appears to be at least 40; 32 passengers and eight employees.

#### LOCOMOTIVE BUILDING.

The Hokkaido Government Railways (Japan) has ordered six mogul engines from the Rogers Locomotive Works.

#### CAR BUILDING.

The Pullman Co. is building 30 cars for its general service.

The Pennsylvania has ordered 100 coal cars from the Pullman Co.

The Georgia, Florida & Alabama has ordered five freight cars from the Georgia Car & Mfg. Co.

The Cuba Co. has ordered 100 cars from the American Car & Foundry Co. They will be built at Berwick.

The Chicago & Eastern Illinois has ordered 500 box cars of 60,000 lbs. capacity from the Pullman Co.

The Oudaky Packing Co. is having 10 cars built at the Chicago works of the American Car & Foundry Co.

The Colorado & Southern is reported to have placed an order with the American Car & Foundry Co. for 750 freight cars.

The Pittsburgh, Shawmut & Northern has ordered 300 coal cars of 70,000 lbs. capacity from the American Car & Foundry Co.

The Kentucky Refining Co. has ordered five freight cars from the American Car & Foundry Co. They will be built at Jeffersonville.

The Louisville & Nashville will build, in its Decatur (Ala.) shops, 200 wooden flat cars of 80,000 lbs. capacity, 250 wooden hopper-bottom coal cars of 100,000 lbs. capacity and 250 wooden box cars of 65,000 lbs. capacity. The flat cars will weigh 26,000 lbs. and measure 36 ft. 6 in. long, 8 ft. 9 in. wide and 4 ft. 5 in. high. The hopper-bottom cars will weigh 42,000 lbs., and measure 30 ft. long and 8 ft. 6 in. wide over sills, and 10 ft. high. The box cars will weigh 37,000 lbs. and measure 36 ft. long, 8 ft. 2½ in. wide and 7 ft. 4½ in. high, inside. The special equipment for all includes: Iron axles, cast-steel body and truck bolsters, Ajax metal bearings, Kelo couplers (made by the McConway & Torley Co.), Wagner doors and fastenings and Miner tandem draft rigging. The box cars will have Chicago roofs.

#### BRIDGE BUILDING.

BOISE, IDAHO.—Plans are made for the bridge over Boise River, and are approved by the County Commissioners.

CANANDAIGUA, N. Y.—The Board of Trade is considering the question of a swing bridge over the canal.

CARDIFF, ALA.—Address Mayor Adam Stewart regarding a bridge proposed over a creek here.

CHATHAM, VA.—Bids, with plans and specifications, are wanted, Oct. 10, by the Board of Supervisors, for a bridge over Pigg River.

COLUMBUS, OHIO.—A committee has been appointed by the Council to consult with the Board of Freeholders on rebuilding the bridges over Elizabeth River that were damaged by the flood.

FERNDAL, PA.—The Grand Jury has ordered a 200-ft. bridge built over Lehigh River.

FLINT, MICH.—The Council has ordered a new bridge built at Court street over Gilkey Creek.

FORT DODGE, IOWA.—It is said bids are wanted on the steel bridge, 2,650 ft. long, over Des Moines River for the Mason City & Fort Dodge, acting for the Chicago Great Western. (Aug. 30, p. 611.)

GLENS FALLS, N. Y.—Bids are wanted until Oct. 19, according to report, for replacing Green's bridge, John D. Patridge, Superintendent of Public Works, Albany.

GRAND RAPIDS, MINN.—Bids are wanted, Oct. 3, for a bridge over Mississippi River. D. M. Gunn, President Village Council.

HOUSTON, TEXAS.—Gonzales County has voted to issue \$30,000 worth of bonds to build bridges.

HURON, OHIO.—The County Commissioners are considering building a bridge over Huron River at a cost of \$10,000.

JERSEY CITY, N. J.—The Board of Chosen Freeholders of the County of Hudson want sealed proposals for the reconstruction of the Newark avenue bridge and draws thereof over the Hackensack River, until Oct. 7, at 5 o'clock, p.m. John P. Egan, Clerk.

LAMPASAS, TEXAS.—San Saba and Lampasas counties have voted to build a bridge over Colorado River.

LA SALLE, ILL.—The town has voted \$7,000 for extending the bridge over Big Vermillion River in Deer Park Township.

MANKATO, KAN.—Bids are wanted, with plans, etc., until Oct. 7, by the County Commissioners, for two stone arches, one over Plum Creek, the other over Disappointment Creek.

MANSFIELD, OHIO.—The City Engineer is ordered to make plans for a viaduct at South Mulberry street.

MENDOTA, MO.—Bids are wanted, Oct. 7, by George W. Dickson, at Yuma, Mo., for a steel bridge.

MIDDLETOWN, OHIO.—The Canal Association is considering improving the banks of the canal by lowering all bridges to the street level, using drawbridges in place of the present high bridges.

NORFOLK, VA.—A commission has been appointed by the County Court to consider the advisability of building an overhead bridge over the Norfolk & Western and the Norfolk & Portsmouth Belt Line.

PEABODY, MASS.—It is reported that the town has voted \$28,000 for rebuilding the Endicott bridge over the Boston & Maine.

POWDERLY, TEXAS.—Bids are wanted, at once, by Wm. Marchbanks, Commissioner, Paris, Texas, for a steel



bridge over Pine Creek. W. G. Thompson, County Surveyor, Powderly.

**ROCKFORD, ILL.**—The Board of Supervisors has ordered bridges built over Otter Creek and the South Kinnikinick.

**QUEBEC, CANADA.**—Chief Engineer A. C. Doucet, Great Northern Ry. of Canada, wants bids immediately for bridges as follows: 160 ft. span over River Ste. Anne; 100-ft. deck span over Blanche River; 100-ft. span over Moine River; one span 200 ft., one span 100 ft. and 2 spans each 50 ft. for bridge over Batiscan River; 30-ft. span over River des Envies, and 125-ft. span over Charest River. Also for four viaducts, 325 ft., 330 ft., 400 ft., 560 ft. long, composed of 30, 40 and 60-ft. spans. All steel to be built to Class 1, Dominion Government specifications.

**RICHMOND, VA.**—The bridge over Bacon's Quarter Branch (Aug. 30, p. 611) will not be built by the Virginia Union University, but by the Seaboard Air Line.

**SALINAS, CAL.**—Bids are wanted, Oct. 8, by J. D. Kaler, County Clerk, for a bridge over Peach Tree Creek.

**SENECA FALLS, N. Y.**—An election will be held to vote on issuing bonds for \$11,000 for building the Rumsey street bridge.

**VICTORIA, B. C.**—W. J. Dowler, City Clerk, is asking tenders for a steel bridge in that city 600 ft. long and 24 ft. wide suitable for highway and electric railroad traffic. C. H. Topp, City Engineer.

W. S. Gore, Commissioner of Lands and Works Department, Victoria, B. C., wants bids for a steel bridge across the Kettle River at Ingrams, West Kootenay District, B. C.

#### Other Structures.

**BROOKLYN, N. Y.**—Plans have been sent to Washington for approval for the new dry dock No. 4 at the Brooklyn Navy Yard. It will be 550 x 90 ft. at the base.

**DULUTH, MINN.**—McCarthy Bros. & Co., of Duluth and Minneapolis, have bought water-front property here, upon which will be built a shipper and receiving elevator of 4,000,000 bushels, and an annex to hold 1,600,000 bushels. They will be of steel, and cost from \$6,000,000 to \$7,000,000.

**GREENVILLE, PA.**—The capacity of the Greenville plant of the Shelby Steel Tube Co. will be greatly increased. A billet mill will be installed.

**HARRISBURG, PA.**—The Philadelphia & Reading contemplates building new stations at Harrisburg, Quakertown, Royersford and other places. For some of these plans have been made.

**HATTIESBURG, MISS.**—The Gulf & Ship Island will establish shops and yards here, a site having been given by the town.

**MASSILLON, OHIO.**—Regarding the report that the Cleveland, Lorain & Wheeling will build a new station here, we are informed that the company will build next year.

**NAPOLEON, OHIO.**—We are informed that the Detroit Southern R. R. will build a four-stall roundhouse and a repair shop at Napoleon.

**NORFOLK, VA.**—J. P. Herbert, Naval Architect, has been engaged to prepare plans and specifications for the proposed plant of the Norfolk Shipyard & Dry Dock Co., recently organized. C. W. Tebault, 719 Citizens' Bank Building, is interested.

**PITTSBURGH, PA.**—Application will be made at Harrisburg, on Oct. 7, for a charter for the Fort Pitt Malleable & Gray Iron Co. The incorporators will be John C. Reilly, James D. Callary, Frank J. Lanahan, John Murphy and J. A. Weldon, of Pittsburgh. The company will make malleable iron and will locate in the Pittsburgh district.

**SHARON, PA.**—The Sharon Steel Co. has let contracts for 10 sheet mills and four additional open-hearth furnaces. These additions will necessitate the expenditure of something like \$1,000,000. The new sheet mills will have a capacity of 100 tons per day, which will bring the total average daily finishing capacity of the Sharon Company's works up to 900 tons per day.

The American Bridge Co. is preparing plans for an addition to the Walker works of the Shiffler Co. in West Homestead. The additions will cost \$250,000.

**SYDNEY, N. S.**—Hiram Donkon, formerly Manager of the Dominion Coal Company, is now in the employ of the Nova Scotia Steel & Coal Co., and is making plans and specifications for a large shipping pier at North Sydney. It will be 67 ft. high and 500 ft. long and will be equipped with apparatus of the latest design for handling coal.

**UNIONTOWN, PA.**—Bids are wanted at 7:30 p.m., Sept. 28, by the Uniontown Acme Radiator Co., for all material and labor for building a foundry building, a machine shop, cupola house and sand shed of brick and steel, excepting the structural steel work, which will be let separate. Information may be had at the office of the architect, Andrew P. Cooper, Uniontown, Pa.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page viii.)

##### Western Society of Engineers.

A special meeting of the Western Society of Engineers was held Wednesday evening, Sept. 18, at its rooms in the Monadnock Building, Chicago. Mr. Wilbur Wright presented a paper on "Late Gliding Experiments," which was illustrated by numerous lantern slides.

##### Rocky Mountain Railway Club.

A meeting of the Rocky Mountain Railway Club was held at the St. James Hotel, Denver, Colo., Saturday evening, Sept. 21. Mr. H. Wilson, Roadmaster Burlington & Missouri River R. R., read a paper entitled, "The Relation of All-Flanged Driving Wheel Tires to Track." This paper was discussed as well as the following topics: "The Effect of Increased M. C. B. Prices for Cleaning Air-Brake Triples and Cylinders;" discussion opened by Mr. J. M. Hines, Denver & Rio Grande. "How to Increase the Membership and Influence of the Club." This was a general discussion.

##### The Franklin Institute.

The programme for the current month is: Wednesday, Sept. 25, 8 p.m., stated meeting of the Physical Section. Crystallization under Electro-Static Stress. Dr. Paul R. Heyl.

Wednesday, Oct. 2, 8 p.m., stated meeting of the Committee on Science and the Arts.

Thursday, Oct. 3, 8 p.m., Section of Photography and Microscopy.

Wednesday, Oct. 9, 1:30 p.m., stated meeting of the Board of Managers; 8 p.m., Mining and Metallurgical Section.

Thursday, Oct. 10, 8 p.m., Mechanical and Engineering Section.

#### PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. F. H. Freeborn, 35 years old, and Auditor of the Buffalo & Susquehanna, shot and killed himself Sept. 20. No cause can be assigned for the act. Mr. Freeborn was born in Knoxville, Tioga County, Pa.

—Mr. J. M. Templeton, General Manager of the West Virginia Northern at Kingwood, W. Va., died Sept. 19. He was about 40 years old, and was at one time connected with the Baltimore & Ohio.

—We are informed that Mr. A. M. Waitt, Superintendent of Motive Power and Rolling Stock of the New York Central & Hudson River Railroad, will go to Europe about Oct. 1, on a short leave of absence. He expects to be gone about six weeks.

—Mr. E. E. Snyder, Division Superintendent of the Louisville & Nashville, has been connected with this company, continuously, since 1887. He was born at Bethlehem, Pa., in 1862, and from 1878 to 1882 was in the mercantile business. He was graduated from the Lehigh University in 1887, and the same year became a rodman on location and construction work on the Mobile & Dauphin Island Railroad & Harbor Company. In 1887 he became Supervisor of Track of the Louisville & Nashville and, as stated above, has served this company ever since. He assumed his new duties on Sept. 1 last.

—Mr. A. F. Sherwood, Auditor of the Georgia Southern & Florida, died Sept. 24, from appendicitis. Mr. Sherwood was born in 1854 at Macon, Ga., and entered railroad service in 1873 as a clerk in the freight office of the Macon & Brunswick. From 1883 to 1886 he was Auditor of Earnings on the Louisville, New Orleans & Texas, becoming, in 1888, Auditor and General Freight and Passenger Agent of the St. Augustine & Palatka and St. Johns Railways of Florida. This position he held for four years, when he became Auditor of Earnings of the Georgia Southern & Florida, and two years later (1892) was appointed to the position he held at the time of his death, namely, Auditor.

—Mr. C. E. Lindsay, Division Engineer of the New York Central & Hudson River, is a graduate of the University of Pennsylvania. He was born at Philadelphia in 1865. He was a topographer for the Union Pacific on surveys until 1886. Two years later he became a levelman on construction for the Cincinnati & Richmond Branch of the Pennsylvania Lines. He then became Assistant Engineer of the Western Division of the Pittsburgh, Fort Wayne & Chicago, and in 1898 was made Engineer Maintenance of Way of the Pittsburgh, Cincinnati, Chicago & St. Louis. From then until September of this year, when he became Division Engineer of the New York Central, he was Resident Engineer of the Washington Division of the Southern Railway.

—Mr. J. N. Barr, Mechanical Superintendent of the Baltimore & Ohio, has accepted the position of Mechanical Superintendent of the Erie, and we understand that this change will take effect Oct. 1. Of course, everybody knows all about Mr. Barr. He began railroad service in the Pennsylvania shops at Altoona, and in 1885 went to the Chicago, Milwaukee & St. Paul as Mechanical Engineer. There he passed through the grades of Superintendent of the car department and Superintendent of Motive Power until Nov. 1, 1899, when he became Mechanical Superintendent of the Baltimore & Ohio. He has won a wide and deserved reputation as an able mechanical officer and administrator and has been for years an important figure in the mechanical associations and the Western Railway Club.

—Mr. Lacey R. Johnson, who recently became Assistant Superintendent of Rolling Stock of the Canadian Pacific, is a native of England, having been born at Abington, Berkshire, June 22, 1855. He entered railroad service in 1870 with the Great Western Railway (England), remaining there until 1875, when he became Foreman of Mechanics. For one year (1878-79) he was Manager of the Davis & Sons Engineering Works, and in September, 1879, went to India as a Draughtsman on the Scindia, Punjab & Delhi Railway, afterwards becoming Foreman of Machines. In 1882, owing to ill health, he left India and went to Canada as a Draughtsman on the Grand Trunk, later leaving this company to go with the Canadian Pacific as Locomotive Foreman. He then became Assistant Master Mechanic of the Eastern Division and in May, 1885, was appointed Master Mechanic of the Pacific Division at Vancouver. Mr. Johnson has spent three different winters in Hong Kong, China, superintending the alterations and repairs to some of the company's ships. In April, of this year, he was appointed Superintendent and Engineer of the Canadian Pacific Navigation Co.'s Fleet, which was purchased by the Canadian Pacific, returning to the locomotive and car department as Assistant Superintendent of Rolling Stock on Sept. 1 last.

#### ELECTIONS AND APPOINTMENTS.

**Atchison, Topeka & Santa Fe.**—The headquarters of F. T. Dolan, Division Superintendent, have been removed from Chicago, Ill., to Fort Madison, Iowa.

**Austin & Northwestern.**—A. K. Vanderwender has been elected Secretary and Treasurer.

**Baltimore & Ohio.**—J. N. Barr, Mechanical Superintendent, has resigned. (See Erie.)

**Blackwell, Enid & Southwestern.**—Robert Holland has been appointed Acting Superintendent and General Roadmaster.

**Delaware, Lackawanna & Western.**—R. M. Mitchell has been appointed Division Engineer, with headquarters at Hoboken, N. J., succeeding Charles S. Millard, resigned, effective Oct. 1.

**Denver & Rio Grande.**—T. Tipton has been appointed Assistant Purchasing Agent, with headquarters at Denver, Colo.

**Erie.**—J. N. Barr, Mechanical Superintendent of the Baltimore & Ohio, has been appointed Mechanical Superintendent of the Erie, to take effect Oct. 1.

At a meeting of the Board of Directors, held recently, F. D. Underwood was elected President and G. M. Cumming, First Vice-President of the Pennsylvania Coal Company and the other coal companies controlled by the railroad company.

**El Paso & Northwestern.**—A. S. Greig, heretofore General Superintendent and Traffic Manager, has been appointed Assistant General Manager and the position formerly held by Mr. Greig is abolished. A. N. Brown has been appointed General Freight and Passenger Agent, with headquarters at Alamogordo, N. Mex.

**Gulf, Colorado & Santa Fe.**—W. E. Maxson, Superintendent of the Gulf, Beaumont & Kansas City, has been appointed Superintendent of the Beaumont Division of the G., C. & S. F. also.

**Grand Trunk.**—R. P. Dalton, Assistant Division Superintendent, with headquarters at Battle Creek, Mich., has resigned, and that position is abolished.

**Minneapolis, St. Paul & Sault Ste. Marie.**—S. W. Derrick has been appointed Division Superintendent, with headquarters at Oakes, N. Dak.

E. Pennington, General Manager, has been elected Second Vice-President.

**Pennsylvania.**—J. Dalman, Jr., has been appointed Master Mechanic, with headquarters at New Castle, Pa.

**Nevada Central.**—S. T. Pearson, heretofore Secretary, Treasurer and Auditor of the San Pete Valley, has been appointed General Manager of the N. C., with headquarters at Austin, Nev., succeeding A. C. Luck, resigned, effective Oct. 1.

**Orange & Northwestern.**—J. W. Parker has been appointed General Freight Agent, and C. M. Rein becomes General Passenger Agent.

**Southern Pacific.**—G. W. Luce, heretofore Assistant General Passenger and Freight Agent of the Pacific System, has been appointed General Freight Agent, succeeding A. D. Shepard, resigned.

**St. Louis & San Francisco.**—H. P. Jacques has been appointed Purchasing Agent.

**Tennessee Coal, Iron & R. R.**—A. W. Clark has been appointed Resident Engineer.

**Washburn, Bayfield & Iron River.**—R. S. Downs has been appointed Superintendent, with headquarters at Washburn, Wis., succeeding E. Stanton, resigned.

#### RAILROAD CONSTRUCTION.

##### New Incorporations, Surveys, Etc.

**BATTLEFORD & LAKE LENORE.**—Application is being made in Northwest Territory, by Messrs. Hannon & Lamont, for an act to incorporate a company to build a line commencing at a point on the Calgary & Edmonton, at or near Hobbema, and running east to a point on the South Saskatchewan River, in Township 39 or 40; thence in a general eastern direction to Lake Lenore; thence in a northeasterly direction to a point on the Canadian Northern at or near Crooked River, in the District of Saskatchewan. A branch line is also asked for from a junction with the company's line in Township 39 or 40, Saskatchewan District, to a point at or near Yorkton, Assiniboia District, N. W. T.

**BISMARCK, WASHBURN & GREAT FALLS.**—This new road in North Dakota and Montana is to be completed as far as Washburn, on the Missouri River, by Oct. 1. The line was completed last season as far as Wilton, which is 17 miles from Bismarck, and Washburn is 28 miles beyond. (April 26, p. 292.)

**CHAMBERSBURG, GREENCASTLE & WAYNESBORO (ELECTRIC).**—Surveys are reported for an electric line in Pennsylvania between the above-named cities, about 12 miles long, paralleling the Cumberland Valley.

**CHICAGO, BURLINGTON & QUINCY.**—A 77-acre tract of land is said to have been purchased adjoining the company's tracks in Harlem, Mo., for switching and freight yard purposes, and it is said that 20 miles of track will be laid on it this fall.

**CHICAGO, MILWAUKEE & ST. PAUL.**—Operation of the new cut-off between Green Island and Brown, Iowa, began Sept. 29. The cut-off is 16 miles long and runs in a southwesterly direction, saving about 25 miles in the run between Dubuque and Toledo. As it affects a number of stations, it is to be used at present chiefly for through trains.

**CHICAGO, ROCK ISLAND & PACIFIC.**—It is said that a coal line, 130 miles long, will be built in connection with the extension from Liberal, Kan., to El Paso. The coal line is projected from Liberty station, 20 miles south of the Canadian River crossing, to extend to the northern part of Colfax County, N. Mex., and it is expected that work will begin at the completion of the present extension. (Sept. 13, p. 643.)

**CINCINNATI & LICKING RIVER.**—Building is now completed between Wellsburg and Brooksville, Ky., 10 miles, and between Johnson and Hillsboro, Ky., 18 miles. The connecting work between Brooksville and Johnson is progressing rapidly, and surveys have been made from Morehead to West Liberty, 26 miles, and thence 30 miles to Paintsville, Ky., in a southeasterly direction.

**DANVILLE & WESTERN.**—The gage of this line is being broadened to standard between Danville and Martinsville, Va., and the work will probably be completed this fall. The D. & W. is controlled by the Southern, but operated independently.

**DAWSON.**—It is planned to build this road from a connection with the Rock Island & El Paso (which is the corporate name of the Chicago, Rock Island & Pacific extension from Liberal, Kan., toward El Paso) at Tucumcari, in Guadalupe County, N. Mex., to Dawson, in Colfax County. This necessitates a crossing of the Canadian River and preliminary surveys have been run. It is thought that an iron structure about 400 ft. long will be built. (Aug. 9, p. 568.)

**DENVER & RIO GRANDE.**—Building is reported begun on the Perin's Peak branch of this road, which is to run from Durango, Colo., to the mines of the Boston Coal & Fuel Co., four miles distant.

**DES MOINES & NORTHERN IOWA.**—A representative of this projected road states that right of way has been secured from Des Moines City to the north line of Iowa without condemnation proceedings. In six towns the road was granted entire right of way across the counties in which the towns were located. The road will be 32 miles shorter than any other line between Des Moines



and Minneapolis, and will have no grade to exceed 28 ft. per mile. The maximum curves are 3 per cent. One large bridge will be required over the Des Moines River at Boone, Iowa. Twenty-six other railroads are crossed by this projected line, and 20 of the crossings will be at grade. A tract of 30 acres in Des Moines, south of the Flint Brick Works, has been bought for the roundhouse and machine shop, and the company now wants right of way through Union Park, along the east shore of the Des Moines River to the lines of the Union Terminal, between Vine street and Court avenue. The company has asked the City Council of Des Moines to give them the right of way to use East Third street, from Locust street to the tracks of the Union Terminal, three blocks, and will buy the remaining right of way from the property owners without condemnation proceedings.

**DETROIT & MACKINAC.**—Maps have been filed by this company showing a proposed change of line in Iosco and Alcona counties, Mich., whereby a number of curves and grades are avoided.

**EVANSVILLE, MT. VERNON & NEW HARMONY (ELECTRIC).**—This company is being organized in Howell, Ind., by A. D. Jones, to connect the points named. The capital stock is to be \$50,000. The total distance is about 35 miles, and the Louisville & Nashville is paralleled between Evansville and Mt. Vernon, 21 miles.

**GOSHEN & SOUTHERN TRACTION.**—Articles of incorporation have been filed in Indiana for an electric line from Goshen, Ind., to Winona Park, by way of Warsaw, Leesburg, Milford and New Paris. The total length is about 34 miles, in Kosciusko and Elkhart Counties, and between Goshen and Warsaw, 28 miles south, the Cleveland, Cincinnati, Chicago & St. Louis is paralleled.

**HARRISBURG & LEWISBERRY.**—A charter has been granted to this company to build a line seven miles long from New Cumberland, near Harrisburg, Pa., south to Lewisberry.

**IDAHO ROADS.**—A company has been organized to build a railroad from Boise City down More Creek and along Grimes Creek, to Idaho City, a total distance of about 40 miles. The capital stock is to be \$40,000 and the project will be presented to the people for subscriptions.

**ILLINOIS CENTRAL.**—It is said that the Vicksburg (Miss.) Board of Trade is making arrangements with the Illinois Central for a branch from Redwood, on the main line of the Yazoo & Mississippi Valley, 12 miles north of Vicksburg, to Valley station on the Yazoo branch of the same, near Yazoo City, Miss. The distance is about 26 miles, and it is thought that the line will be built if right of way is granted.

**INDIANAPOLIS, PLAINFIELD & WESTERN (ELECTRIC).**—Contracts for building this line have been awarded to an Eastern company. The length is to be 14 miles, and it is stipulated that work shall begin within 60 days. Franchises have been granted for turnpike way, and no private land will be needed. (June 28, p. 474.)

**INTERNATIONAL & GREAT NORTHERN.**—It is said that an extension will be built from Spring, Texas, 24 miles north of Houston, on the main line, to Beaumont, 80 miles east, by way of Sour Lake. Negotiations are in progress for rights of way. This extension would parallel for 48 miles the Southern Pacific, between Liberty station and Beaumont.

**IOWA & NORTHERN.**—The organization of this company was completed in Iowa, Sept. 17, with a capital stock of \$125,000, and chief office at Clinton, Iowa. The company intends to build a line between Clinton and Davenport, Iowa, 34 miles, to be operated either by electricity or compressed air. The Davenport, Rock Island & Northwestern, which leases trackage rights to the Chicago, Burlington & Quincy and the Chicago, Milwaukee & St. Paul between these points, is paralleled. The officers of the new company are: President, F. J. Snencer, Wauseon, Ohio; Vice-President, W. E. Hill, Oak Harbor, Ohio; Secretary, Fred J. Bollmeyer, Wauseon; Treasurer, C. C. Handy, Wauseon; Assistant Treasurer and General Superintendent, Harry W. Dean, Clinton, Iowa; Superintendent of Construction, J. A. Foster, Attica, Ind.; Counsel, F. S. Ham, Wauseon.

**IOWA ROADS.**—There are persistent rumors that citizens of Pella, Iowa, on the line of the Chicago, Milwaukee & St. Paul, will build a spur across to the Wabash at Howell. The Wabash runs parallel at this point, three miles distant. Both towns are in Marion County.

**KENTUCKY ROADS.**—Surveys are reported for a new line between Owingsville and Preston, Ky., five miles. The last named station is on the line of the Chesapeake & Ohio.

**LOUISIANA ROADS.**—A 99-year franchise has been granted in Houma, La., to promoters of the proposed electric line between Houma and Thibodaux. It is said that contracts will be let some time this year, and there are about 130 miles of line to be built.

**MAINE ROADS (ELECTRIC).**—Articles of association of the Augusta & Warren R. R. have been approved by the State Commissioners. It is said that this will probably be an extension of the line between Augusta and Togus, and that it will be continued through Chelsea, Whitefield, Jefferson and Waldboro to Warren, where connection will be made with the Georges Valley steam railroad. The total length of line will be about 27 miles, and the capital stock is \$300,000. The directors are: Gov. John F. Hill, George E. Macomber, George W. Vickery, P. O. Vickery and Thomas J. Lynch.

**MANISTIQUE.**—This railroad, now in operation from Grand Marais to Germfask, in the Upper Peninsula, will extend its line about eight miles into Mackinac County, Mich. A connection is now made with the Duluth, South Shore & Atlantic, and it is planned to build to a connection with the "Soo" line at or near Corinne.

**MANITOULIN & NORTH SHORE.**—Surveys of the Bruce Peninsula section of this line from Wiarton to Tobermory, Ontario, 55 miles northwest, are to be begun at once. The section on Manitoulin Island is to be surveyed during November. The route between the town of Sudbury, Ont., and Little Current is already located, a large portion completed and the rest now building.

**MICHIGAN ROADS.**—A steam railroad from Traverse City, Mich., to Northport, at the north end of the peninsula formed by Leelanau County, is being promoted by Daniel Kaufman, of Grand Rapids; the distance is 30 miles. According to the project, moreover, a car ferry is to be run across Lake Michigan to Manistiquette 63 miles northwest, on the line of the Minneapolis, St. Paul & Sault Ste. Marie.

**MUNISING.**—Maps have been approved showing a proposed extension of this line from its present terminal at Munising in Alger County, Mich., with a grade crossing of the Duluth, South Shore & Atlantic near Wetmore.

This road is in operation from Munising, on South Bay, Lake Superior, to Little Lake, 38 miles west, with a branch and terminals that bring the total mileage to 56.

**NIOBARA, MISSOURI RIVER & WESTERN.**—Articles of incorporation were filed in Camden, N. J., for this company, which proposes to build railroads in Nebraska and North and South Dakota. Capital, \$300,000.

**NORTHERN TEXAS TRACTION.**—It is said that the electric line between Fort Worth and Dallas will be completed early next year. All contracts have been let, and tracklaying is in progress. This route parallels the Texas Pacific.

**NOVA SCOTIA STEEL & COAL.**—It is said that this company will build a line to the coal areas in Bouladerie, Cape Breton Island, Nova Scotia, with a bridge across the Bras d'Or Gut. The Nova Scotia Steel & Coal Co. now operates short detached lines in New Brunswick and Nova Scotia which connect with the Intercolonial.

**OREGON RAILWAY & NAVIGATION.**—The contract for the projected spur from Albina, near Portland, Ore., down the Willamette River to St. Johns, Ore., has been let to Kilpatrick Bros., contractors. About five miles of road are to be built, chiefly over bottom land, which is subject to the annual inundations of the Willamette, above the high water mark of which the track must be raised. (May 17, p. 342.)

**OREGON SHORT LINE.**—An officer writes that 60 miles of the Utah, Nevada & California extension, projected from Uvada, Utah, by way of Calientes and Las Vegas, Nev., to the Nevada-California State line, 215 miles, is under contract to the Utah Construction Co., of Ogden. Grading has been completed between Uvada and Calientes, 41 miles, and track laid. There are 350 men and 80 teams at work, and extension is proposed from the Nevada-California State line to Ludlow, Cal., but not yet surveyed. (June 7, p. 390.)

**PLANT SYSTEM.**—Contracts to grade the Jesup Short-line extension of the Savannah, Florida & Western, between Folkson and Jesup, have been let to L. R. Wright & Co., of Macon, Ga. The line is very nearly straight and includes only two small bridges. It is being laid with 80-lb. rail and should be finished this winter. (July 26, p. 540.)

**SEBASTICOOK & MOOSEHEAD.**—An officer writes that the extension from Hartland, Me., to Mainstream Village, seven miles, has been completed, and that it will not be continued at present.

**SOUTH BERWICK, ELIOT & YORK (ELECTRIC).**—This company has been incorporated in Maine with a capital of \$80,000 to build between the points named, 20 miles. The directors are Hon. John F. Hill, H. M. Heath, C. R. Hall, Marcellus Shaw and G. W. Vickery, all of Augusta.

**ST. LOUIS & NORTH ARKANSAS.**—The State Board of Railroad Incorporators in Arkansas have granted an amendment to this company's charter, allowing it to extend its road from the present terminus at Harrison, 60 miles southeast to Leslie, which is near Marshall, in Searcy County, Ark. (May 31, p. 374.)

**ST. LOUIS, KANSAS CITY & COLORADO.**—An officer writes that on the extension of this road from Union, Mo., 292 miles west to Kansas City, by way of Freeburg, Versailles and other places, 91 miles, from mile section No. 48 to 138, are under contract to H. F. Balch & Co., and that 107 miles of the line has been graded between St. Louis and Belle, and that the railroad is in operation between these points. The approaches have been graded to three tunnels, one 750 ft. long, one 1,100 ft. and one 1,300 ft., and there are about 900 men and teams at work. (June 14, p. 422.)

**ST. LOUIS SOUTHWESTERN.**—It is said that an extension 14 miles south to Dallas, Texas, will be built if the right of way for four miles is given by the city, and arrangements to effect this are reported. The line has no connection with Dallas at present.

**TACOMA SOUTHERN RAILWAY & NAVIGATION.**—A company has been incorporated in Washington, under this name, with a capital of \$4,000,000, to build a railroad from Tacoma southeast to the Columbia River, at or near The Dalles. The incorporators are: William Bailey, New York; Ira A. Town, R. R. Christie, J. K. Dorr, A. U. Mills and W. C. Halliday, Tacoma. The air line distance between the points named is about 125 miles.

**TEXAS ROADS.**—J. J. Sparrow, of Windsor, Ont., has formed a company with a capital of \$4,000,000, to build a railroad from Corpus Christi south along the Gulf of Mexico to Brownsville, Texas, about 160 miles. A charter for a railroad between these points was formerly in existence, but is thought to have expired by limitation. Further extensions from Brownsville are proposed. At present, there are no north and south roads in this part of Texas.

**TRANS-ALASKAN.**—This company has been incorporated under the laws of the State of Washington, with a capital of \$50,000,000, to build a line in Alaska which is to connect, by means of steel car ferries, with the projected Trans-Siberian road and constitute the American end of the same. J. J. Frey, President of the Florence & Cripple Creek, is President.

**WABASH.**—Bids were opened, Sept. 13, for building the 28 miles on the Pittsburgh, Carnegie & Western, from Bridgeville, Pa., to the Ohio River. Forty bids were received and it will take some time to make the award.

**WASHINGTON, WESTMINSTER & GETTYSBURG.**—An officer writes that this line is under contract for its entire length of 78 miles, from Rockville, Md., to Gettysburg, by way of Saytonsville, Damascus, Mt. Airy and other places, and that grading will be begun about Oct. 15. James B. Colegrove, of New York, is President of both the Maryland and Pennsylvania companies, but the other officers are different in each state.

**WESTERN OKLAHOMA.**—An officer writes that the contract for this portion of the Choctaw, Oklahoma & Gulf extension has been let to Johnson Bros. & Faught, of Oklahoma City, from Weatherford, Okla. T. to the Texas line. Grading is reported completed on the above contract from Weatherford to Sayre, 64 miles, and it is thought that track will be laid by Oct. 1.

**WEST VIRGINIA ROADS.**—The narrow gauge line which is being built by the Holly Lumber Co. from Pickens, W. Va., through timber lands, is now completed for 10 miles, as far as Sugar Creek, and is in operation as a lumber road between these points. (Official.)

**WISCONSIN CENTRAL.**—It is said that the line between Rugby Junction and Allenton, in Washington County, Wis., is to be rebuilt in order to do away with the heavy grades which at present exist between these points. The distance is 11 miles.

## GENERAL RAILROAD NEWS.

**ATLANTIC & GULF SHORT LINE.**—A mortgage has been made to the Knickerbocker Trust Co., of New York, to secure \$4,000,000 5 per cent. 30-year gold bonds. The company operates 32 miles of road between the Ochopee River and Midville, Ga., and intends to extend northeast to Augusta, about 54 miles, and southwest to St. Andrews Bay, Fla., a total of 335 miles projected.

**BALLSTON TERMINAL (ELECTRIC).**—A mortgage to secure \$1,200,000 bonds has been made to the Atlantic Trust Co., of New York. The proceeds will cover the extension of the line to Amsterdam, Johnstown and Gloversville, N. Y., a total of about 40 miles. The bonds are first mortgage, 30-year 5 per cents., and there are at present \$250,000 30-year first mortgage 5s outstanding, due in 1926.

**BAY OF QUINTE RY.**—It is said that this company, which operates about 91 miles of road in Ontario between Kingston, Deseronto, Tweed and other terminals, is to be secured by the Canadian Pacific. The absorption of this line, in connection with the recently acquired Kingston & Pembroke, will give the Canadian Pacific more ports on Lake Ontario, and put it on a more equal footing with the Grand Trunk for water connections.

**CENTRALIA & CHESTER.**—Suit has been brought in the U. S. Circuit Court at Springfield, Ill., by H. W. Sage, & Co., of Albany; Theodore Sykes, of Boston, and T. W. Bollen, of Jersey City, to set aside the sale of this property to John R. Walsh, of Chicago. The sale took place last May, for \$450,000, and the complainants offer to pay \$1,000,000 for the road if it is set aside. The Farmers' Loan & Trust Co., are the trustees.

**CINCINNATI SOUTHERN.**—The Sinking Fund Trustees voted, on Sept. 14, to extend the lease of this road to the Cincinnati, New Orleans & Texas Pacific, in spite of a minority protest. \$2,500,000 of bonds were also voted, the proceeds of which are to be applied to terminal purposes. The present lease was made in 1881, to extend 25 years, and would expire Oct. 12, 1906. By its terms, the rental for the next five years would be \$1,250,000 per year. A slight change in the method of payment is now afforded, and after 1906 the rental under the extension is divided into three 20-year periods, in the first of which the rental is to be \$1,050,000 per year; in the second, \$1,100,000, and in the third, \$1,200,000, in addition to which the interest and sinking fund for the redemption of the \$2,500,000 terminal bonds is to be paid by the lessee. This proposition will be submitted to a general vote in November.

**DETROIT & NORTHWESTERN.**—The mortgage bond issue of 1899 is to be discharged as soon as the bonds not yet delivered, six in number, are sent in to the Union Trust Co., of Detroit. By the terms of the 1901 mortgage, \$855,000 of bonds are to be issued at once to pay the outstanding indebtedness of the company, and a balance of \$145,000 is to be held in reserve.

**FITCHBURG.**—The shareholders will vote, Sept. 25, on a proposition to issue bonds not to exceed \$2,000,000 to provide for the \$500,000 issue, due Oct. 1, and a like amount due next April; the remainder to be applied to betterments and extensions under the Boston & Maine lease.

**GAINESVILLE & DAHLONEGA (ELECTRIC).**—A mortgage has been made to the Knickerbocker Trust Co., of New York, to secure \$750,000 40-year gold 5s. The company was incorporated in Georgia in April, 1901, with an authorized capital stock of \$500,000, and is now under construction between the points named; a distance of about 27 miles. Electricity is to be generated by a water-power plant on the Chattahoochee River. W. W. Murray is President.

**GAINESVILLE & GULF.**—Application to the U. S. Circuit Court at Huntsville, Ala., has been made for the appointment of a receiver, by the Standard Trust Co., of New York. The road extends from Fairfield, Fla., to Sampson City, Fla., via Gainesville, and is in default of interest on a \$150,000 mortgage. The capital stock is \$300,000.

**LONG ISLAND.**—President Baldwin, in his annual report, makes the following statement regarding the East River Tunnel: "The Long Island Extension Railroad Company was organized on June 21, 1901, to construct a double track tunnel electrical railroad as a practical extension of your system into New York City. It will extend from the terminal of the Long Island Railroad at Long Island City, under the East River and Thirty-third street, making connection with the underground station of the New York subway at Thirty-third street and Fourth avenue, and having an underground station near Broadway. Application for the necessary franchise has been made to the Board of Rapid Transit Commissioners of the City of New York. As soon as the necessary franchise is obtained work will be begun and pushed as rapidly as possible, and when completed the line will be operated by the Long Island Railroad Company."

**MICHIGAN CENTRAL.**—At the meeting of the shareholders of Dec. 10, a vote is to be taken on a proposition to surrender the present charter and re-incorporate under the Michigan law of 1897.

**OHIO ROADS.**—At the annual meeting of the directors of the Toledo & Ohio Central and Kanawha & Michigan, a consolidation was effected with the Hocking Valley, and M. S. Connors, now General Superintendent of the Hocking Valley, was appointed General Superintendent of all the lines under the supervision of the new consolidation.

**PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.**—A new first mortgage has been authorized for the Chartiers, which extends from Carnegie, Pa., to Washington, Pa., 23 miles, to secure \$625,000 of 3½ per cent. bonds, \$500,000 of which are to be used in refunding a like amount of 7s, due Oct. 1, and the remainder reserved.

**RED FORK & SHAWNEE COAL & RAILWAY.**—It is said that bonds to the amount of \$1,000,000 have been sold for this company to provide for their new line which is projected to run from Red Fork, Ind. T., to Shawnee, Okla. T., about 80 miles.

**ST. LOUIS & MEMPHIS.**—Articles have been filed in Missouri for the consolidation of the St. Louis & Memphis, the Memphis & St. Louis, and the St. Louis, Caruthersville & Memphis, with a joint capital of \$1,250,000, under the above title. These roads are located in Southeastern Missouri, and the last named extends over the Arkansas border to Blythesville, Ark. The St. Louis & San Francisco is thought to be interested.

**SHORE LINE.**—This road has been sold to Russell Sage, of New York, for \$25,000. It was previously controlled by him.